

A REVISION OF THE TROMBID AND ERYTHRAEID MITES OF AUSTRALIA WITH DESCRIPTIONS OF NEW GENERA AND SPECIES

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Fig. 1-235.

THE two families of Acarina dealt with in this paper are very closely related; both belong to the suborder Prostigmata, characterized by the position of the stigmata, which open at the base of the mandibles in the adults.

In general appearance the members of both families are similar, but in the Erythraeidae the mouth-parts are more or less retractile, while in the Trombidiidae they are not so. In the larval forms the Trombidiidae have a stigmal opening between the first and second coxae.

Several species of Trombidiidae are of economic importance, for their larvae are not only of great annoyance to man, but transmit disease. In Japan the Kedani or river fever is caused by the bite of the Akamushi (*Microtrombidium akamushi* Brumpt.), while in Queensland and the Coorong district of South Australia the ti-tree itch mite (*Trombicula hirsti* Sambon) is a source of irritation to campers. The harvest mites of Europe comprise the larval forms of several species; similarly in America other species are regarded as pests. Other larval Trombids, while not attacking man, are pests of various animals, such as cats, rodents, and marsupials, and are generally to be found in the ears, on the scrotum, etc. Adult Trombids, as far as is known, feed upon insects and their eggs.

As far as is known none of the Erythraeidae attacks man or animals, but all species are essentially parasites of the early stages of insects. The adults probably have similar habits to the adults of the Trombidiidae.

In studying these creatures one is faced with the difficulty that only in one or two cases have the life-histories been to any extent worked out, and is forced to give both generic and specific names to larval forms without any correlation with the adults.

Comparatively little work on this section of the fauna has been carried out in Australia, only four workers having written on them, namely, W. J. Rainbow, N. Banks, S. Hirst, and L. W. Sambon. Most of our knowledge is due to the work of Mr. S. Hirst, who was in South Australia during the years 1927-1928.

In 1906 W. J. Rainbow (14) listed two species of Trombidiidae, *Trombidium sericatum* sp. nov. and *Trombidium puparium* Canestrini. In this paper the first-named is referred to the genus *Cucenothrombium* of Oudemans, and is shown to be synonymous with two of Hirst's later species. I have not been able to see the original description of the second species, but as Berlese, in his monograph of the group (3), does not mention it, probably it is not recognizable now and can be dropped. In addition Rainbow records three occurrences of "*Leptus* spp." on various insects. It is possible that these do belong to the genus *Leptus* (Erythraeidae) as now understood, especially considering their hosts; almost certainly they should not be placed in the Trombidiidae. Amongst the Erythraeidae Rainbow lists *Smaridia cetracea* Koch from Queensland, *Rhyncholophus montana* sp. nov. from Mount Kosciuszko, and *Rhyncholophus celeripes* sp. nov. from Enfield, N.S.W. I have not seen the original description of the first, and do not discuss it in this paper. The second is shown herein to be a species of *Caccalisoma*, and the third a species of *Erythraeus*.

The next paper was by Banks (2), who described a number of Acarina taken in association with ants by the late Mr. A. M. Lea in Victoria and Tasmania. Amongst the Trombidiidae he described *Trombidium aequalis*, which is referable to *Microtrombidium*, as are also *Rhyncholophus altolus* and *R. rufentus*, which he refers to the Erythraeidae. *Pessonin prominens* Banks is a true member of the Erythraeidae, but the genus must be changed to *Calyptostoma*.

The first of Hirst's papers dealing with the Australian species was that in the Annals and Mag. Nat. Hist. for 1926 (6), when he described the following species: *Allothrombium terraereginae*, *Allothrombium* (*Mesalthrombium*) *antipodianum*, *A. (M.) a.* var. *olovinum*, all belonging to the Trombidiidae. In the same journal for 1928 (8) he added the following species: *Chyzern australiense* sp. nov., *Neotrombidium barringtonense* sp. nov., *Diplothrombium australiense* sp. nov., *Microtrombidium barringtonense* sp. nov., *Microtrombidium* (*Eucenothrombium*) *collinum* sp. nov., *M. (E.) wyandrac* sp. nov., *Dinothrombium nynganense* sp. nov., *D. splendidum*, sp. nov., *D. torridum* sp. nov., *D. crassum* sp. nov., and *Allothrombium wyandrac* sp. nov. amongst the Trombidiidae; and *Caccalisoma nasutum* sp. nov., *Leptus pilosus* sp. nov., *L. reginae* sp. nov., *L. antipodianus* sp. nov., *L. imperator* sp. nov., *Micromuris gounae* sp. nov., and *Belaustium warregense* sp. nov. amongst the Erythraeidae. Of the above all his species of *Dinothrombium* are placed herein in the genus *Cucenothrombium*, and *D. splendidum* is regarded as a synonym of *C. sericatum* (Rainbow). The species of *Leptus* are now placed under *Erythraeus*, and *L. imperator* and *L. antipodianus* are included in the synonymy of other species. *Belaustium warregense* is a member of the genus *Leptus* as now defined.

In the Proc. Zool. Soc. London for 1928 (⁹) Hirst listed the following: *Chyzeria montana* sp. nov., *C. musgravi* sp. nov., *Microtrombidium parvum* sp. nov., *M. affine* sp. nov., *M. montivagum* sp. nov., *M. (Ecnemathrombium) koordunum* sp. nov., *M. (E.) simile* sp. nov., *Allothrombium guttatum* sp. nov., *A. ornatum* sp. nov., *A. insigne* sp. nov., *A. antipodianum* var. *kondinium* var. nov., *Dinothrombium rainbowi* sp. nov., *D. ventricosum* sp. nov., *D. nobile* sp. nov., *D. angustae* sp. nov., and *D. taylori* sp. nov. belonging to the Trombidiidae. Of these *C. musgravi* is reduced in this paper to varietal rank; *M. montivagum* is placed in the genus *Caenothrombium*, and *D. rainbowi* is considered synonymous with it. *Allothrombium ornatum* is treated as a synonym of *A. guttatum*, *D. ventricosum* of *C. scricatum* (Rainbow), and *D. taylori* of *C. torridum*. *Allothrombium insigne* is placed in the new genus *Australothrombium*, as is also *A. antipodianum* var. *kondinium*, which is shown not to be related to *A. antipodianum*.

In the same journal for 1929 (¹⁰) Hirst added to the list *Chyzeria armigera* sp. nov., *C. insulana* sp. nov., *C. occidentalis* sp. nov., *Trombella warrengensis* sp. nov., *Allothrombium (Mesothrombium) australiense* sp. nov., *A. parvulum* amongst the adult Trombidiidae, and *Trombicula novae-hollandiae* sp. nov., *Schongastia dasycerei* sp. nov., and *S. antipodianum* sp. nov. amongst the larval forms. He suggested that *C. occidentalis* might be only a variety of *C. australiense*, and I agree with this view.

In the Annals and Mag. Nat. Hist (¹¹), 1927, Dr. L. W. Sambon described a larval Trombid from Queensland as *Trombicula hirsli*, while in the same publication for 1929 Hirst recorded this species for South Australia, and described another larval form under the name of *Schongastia coorongense*.

The previous known adult species of Trombid and Erythraeid Mites from Australia, therefore, omitting one or two doubtful forms, as well as those herein regarded as synonyms or reduced to varietal rank, are as follows:

Adult Trombidiidae, 32 species and 2 varieties.

Larval Trombidiidae, 5 species.

Adult Erythraeidae, 9 species.

Larval Erythraeidae, nil.

In the present paper 46 species and 4 varieties of adult Trombidiidae are listed, of which 2 genera, 14 species, and 1 variety are new. Of the larval Trombidiidae 2 new species are added. In the Erythraeidae 24 adult forms are listed, of which 14 species and 1 genus are new. No larval Erythraeids have been previously recorded from Australia, but no fewer than 9 species are now described.

The writer is grateful to the Authorities of the Australian Museum, Sydney.

for the loan of type material, while his gratitude can hardly be expressed to Professor Harvey Johnston, to whom the material collected by Hirst while in Australia had been given by Mrs. Hirst. This material contains a large number of Hirst's types, the location of which may not have been made known otherwise. These types and many other of Hirst's specimens have been deposited by Professor Johnston in the South Australian Museum. Thanks are also due to many other friends who have collected specimens which have assisted in the preparation of this paper.

FAMILY TROMBIDIIDAE.

CHYZERIA Castelnovi, 1897.

CHYZERIA AUSTRALIENSE Hirst, 1928.

The type of this species, from "Swan River, West Australia" is in the South Australian Museum. It is labelled as from the nest of the ant *Ponera lutea*. A second specimen from the same locality is a paratype.

Through the kindness of the Authorities of the Australian Museum, Sydney, I have been able to examine all the types of Hirst's Australian species, with the exception of *C. occidentalis*, and to compare them with a number of additional specimens recently taken in South Australia.

C. occidentalis was described in 1929 (¹⁰) by Hirst from a specimen collected on Rottnest Island, West Australia. In his remarks he expressed the opinion that it might only be a variety of *C. australiense*, differing mainly in the shorter and stumper palpal claws and in the rather more developed lateral body processes. From an examination of all the material before me I quite agree with this view, and in this paper treat it as such.

Further, Hirst's *C. musgravei* must also be considered as a variety differing in that the median anterior plate is developed into a comparatively long process. One specimen amongst the Hirst material in Professor Harvey Johnston's keeping, and now in the South Australian Museum, is clearly intermediate between the two forms in respect of this character, the process being shorter and triangular. This specimen was labelled in pencil by Hirst as *C. musgravei*. All the specimens collected recently by Mr. M. W. Mules and myself in the Adelaide District agree with this intermediate form, for which the name *C. australiense* var. *hirsti* var. nov. is proposed.

Loc. Type: Willunga, West. Aust.; paratypes: Woodside, S. Aust., July, 1933 (W.M.); Mt. Osmond, S. Aust., Sept. 17, 1933 (H.W.); Glen Osmond, S. Aust., Oct. 1, 1933 (H.W.).

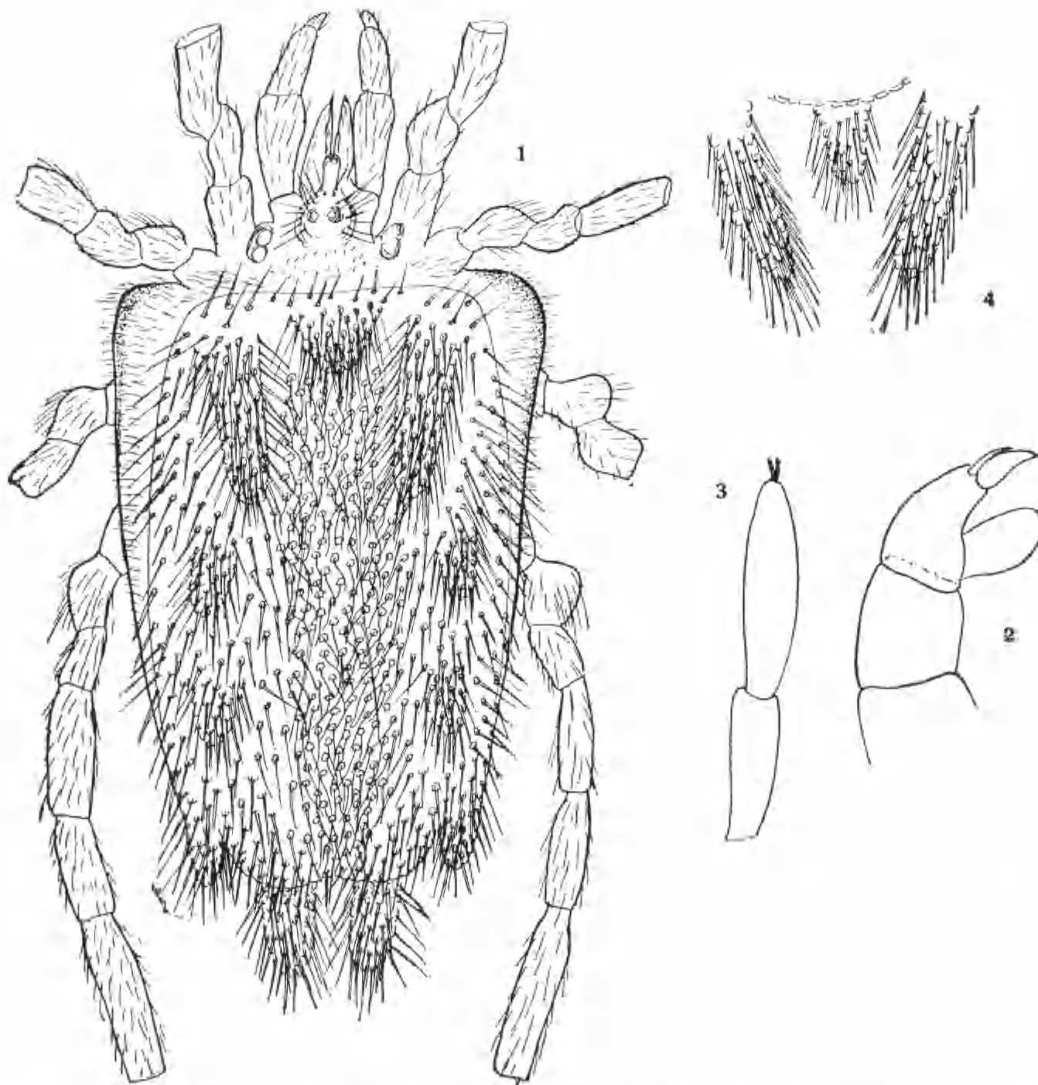


Fig. 1-4. *Chyzeria australiense* Hirst: 1, dorsal view; 2, palp; 3, front tarsus and metatarsus; 4, anterior lateral and medial dorsal prominences of var. *musgravei* Hirst.

KEY TO THE AUSTRALIAN AND NEW ZEALAND SPECIES OF CHYZERIA.

1. Second and third pairs of dorsal lateral processes poorly developed and almost obsolete. No distinct median anterior dorsal process, only a plate with rounded posterior edge. A distinct and comparatively long median process posteriorly and ventrally. Front tarsus rather more than 3 times as long as high and one-fourth as long again as the metatarsus. Palp with comb and long accessory claw. *C. australiense* Hirst f.p.
- Second and third pairs of dorsal lateral processes distinctly developed . . . 2.
2. A triangular or elongate median anterior process present 3.
- No such process, only a posteriorly-rounded plate 4.
3. With a comparatively long median anterior process.
C. australiense var. *musgravei* Hirst.
- With a short triangular process antero-medially.
C. australiense var. *hirsti* var. nov.

4. Terminal claw and accessory claw of palp short and stumpy 5.
 Terminal and accessory claws of palp long 6.
5. Unpaired medio-posterior ventral process minute *C. insulana* Hirst.
 This process comparatively long and slender. *C. australiense* var. *occidentalis* Hirst.
6. Medio-posterior ventral process minute. Large species. Lateral processes long and with the long ciliated hairs numerous *C. armigera* Hirst.
 Medio-posterior ventral process long and slender 7.
7. Anterior lateral pair of dorsal processes long and slender, longer than the next pair. Large species *C. montana* Hirst.
 Anterior pair of lateral dorsal processes little longer than the next pair. *C. novae-hollandiae* Hirst (New Zealand).

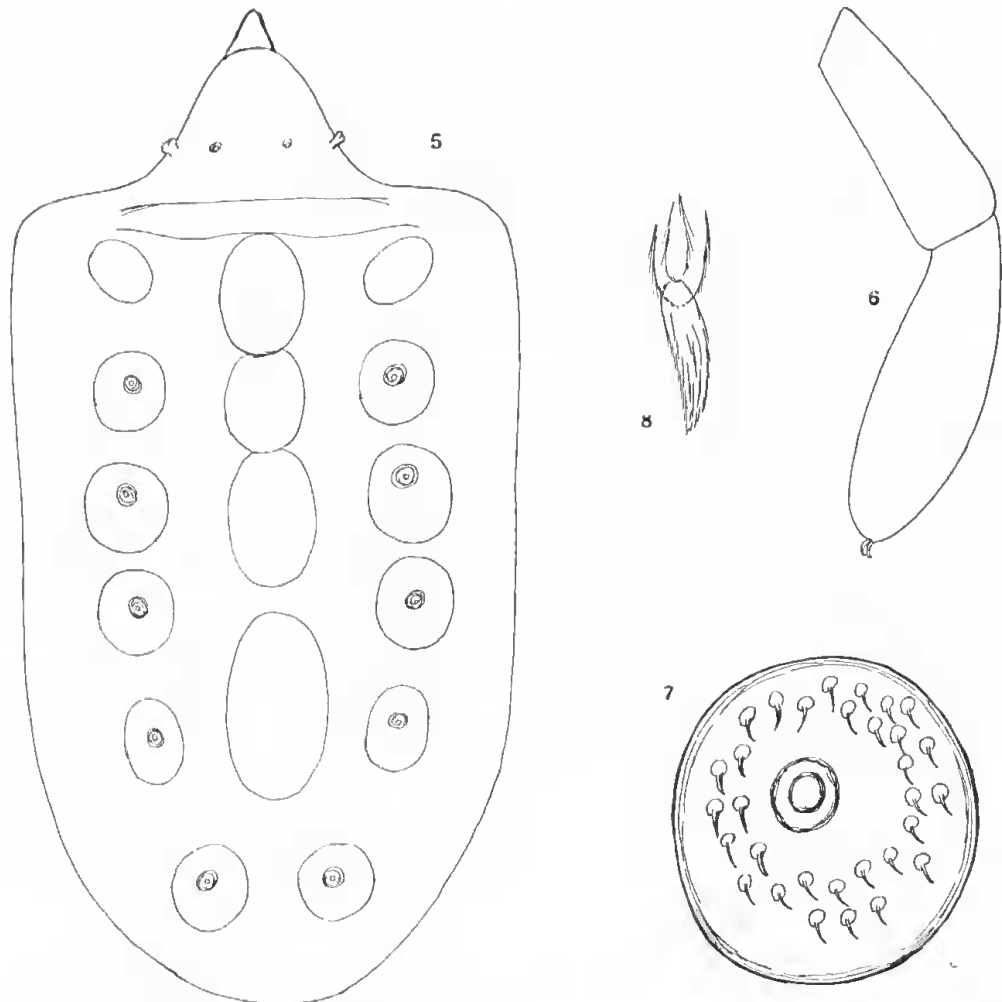


Fig. 5-8. *Trombella warregensis* Hirst: 5, outline of body showing shape and dorsal pits; 6 front tarsus and metatarsus; 7, one of the lateral dorsal pits much enlarged showing setae; 8, one of the setae much magnified.

TROMBELLA Berlese, 1887.

TROMBELLA WARREGENSIS Hirst, 1929.

The type of this species was amongst the Hirst material left in Adelaide, and is now in the South Australian Museum.

The description given by Hirst (10) is very full and adequate, but only the front tarsus and the tip of the palp were figured. A drawing showing the shape of the animal and the general arrangement of the dorsal pits and the spines of the same, together with another figure of the front tarsus and metatarsus, are now given.

The type locality was the River Warrego, New South Wales, August, 1928.

NEOTROMBIDIUM Leonardi, 1901.

NEOTROMBIDIUM BARRINGUNENSE Hirst, 1928.

The type of this species is now in the South Australian Museum. It was found amongst the Hirst material in Adelaide.

There is nothing to add to the original description (8), and the author's

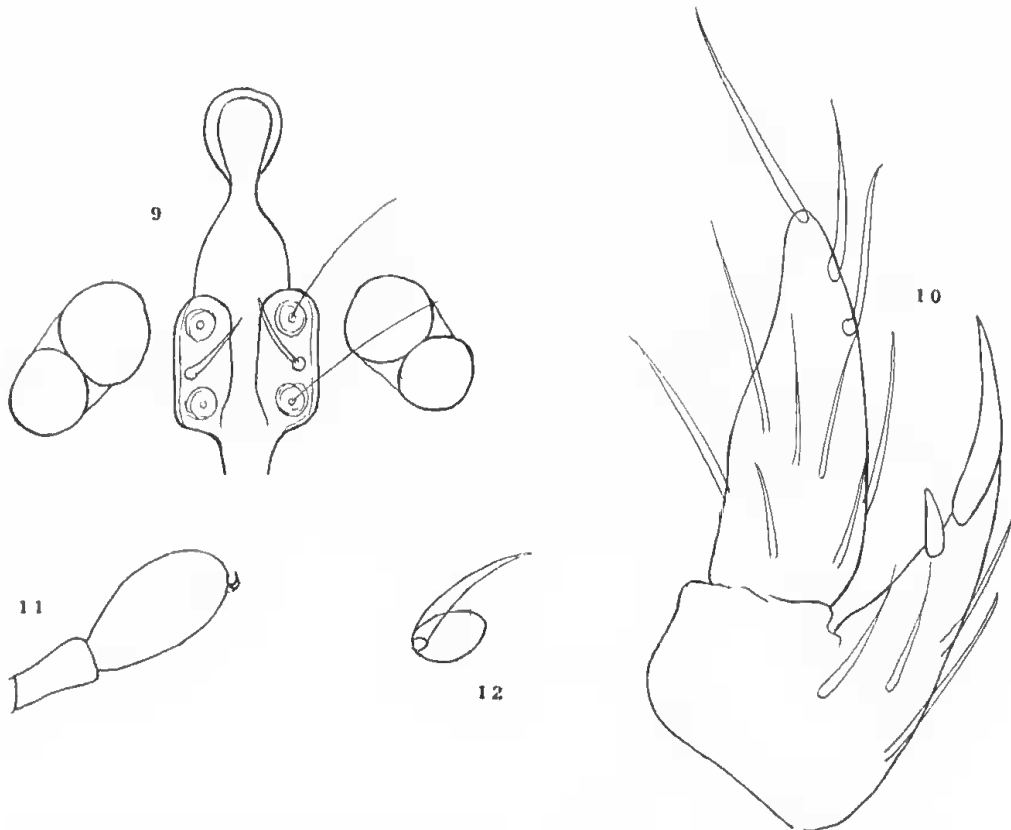


Fig. 9-12. *Diplothrombium australiense* Hirst: 9, crista and eyes; 10, palp; 11, front tarsus and metatarsus; 12, one of the dorsal setae.

figures of the palp, front tarsus and metatarsus and dorsal setae (¹⁰) are adequate.

DIPLOTHROMBIUM Berlese, 1910.

DIPLOTHROMBIUM AUSTRALIENSE Hirst, 1928.

This interesting species was described from specimens collected by Hirst at Charlesville, Queensland, in June, 1927 (⁸). Other specimens were from Gawler, South Australia, in March, 1927. The original description was not accompanied with any figures, but Hirst later (¹⁰) figured the front tarsus and metatarsus and the palp.

The syntypes from Charlesville, as well as the Gawler specimen and another from Dubbo, Queensland, were in the Hirst material, and are now in the South Australian Museum.

There is little to add to the original description, but one or two additional details are figured. Hirst's statement that the sensillary area of the crista has three pairs of sensillae is erroneous. The median pair of hairs are not of a sensory nature and do not arise from pits like true sensillae. They are in every respect similar to the ordinary body setae.

MYRMICOTROMBIUM gen. nov.

Diagnosis of Genus: Crista short with two sensillary areas at anterior and posterior ends. One eye on each side, in front of the anterior end of crista. Body as in *Microtrombidium*. Tarsi at end truncate with one or two small raised prominences from which arise plain setae.

Remarks: In having two sensillary areas to the crista this genus comes near to the preceding and also to the genus *Rohaultia* of Oudemans. *Diplothrombium* has the two sensillary areas adjacent and in the middle of the crista. *Rohaultia* has them separated, one being anterior and the other median on a transverse plate. This new genus differs from both in having only a single eye on each side, in this respect resembling *Trombicula*.

Genotype: *Myrmicotrombium brevicristatum* sp. nov.

MYRMICOTROMBIUM BREVICRISTATUM sp. nov.

Description: Length 0.85 mm. Colour in life pinkish-white. Crista well developed but short, 160 μ , with anterior and posterior sensillary areas each with a pair of sensory hairs about 60 μ long. Eyes, one on each side, large, and placed distinctly in front of the anterior end of crista. Palpi long, with the usual tibial claw, but without accessory claws or spines, palpal tarsus long, not clubbed and well overreaching the tip of claw. Legs shorter than body, II and III shorter than

I and IV, tarsi I and II with two small tubercles on the truncated end, from each of which arises a plain seta, III and IV with one tubercle only, claws strong and simple. Front tarsus $120\ \mu$ long and $50\ \mu$ high, subelliptical, metatarsus narrower but as long as tarsus. Clothing of numerous densely feathered hairs, the longer ones $35\ \mu$ and decidedly bushy, the shorter ones only $15\ \mu$.

Locality: A single specimen collected with ants at Glen Osmond, South Australia, September 11, 1933.

Type: In the South Australian Museum.

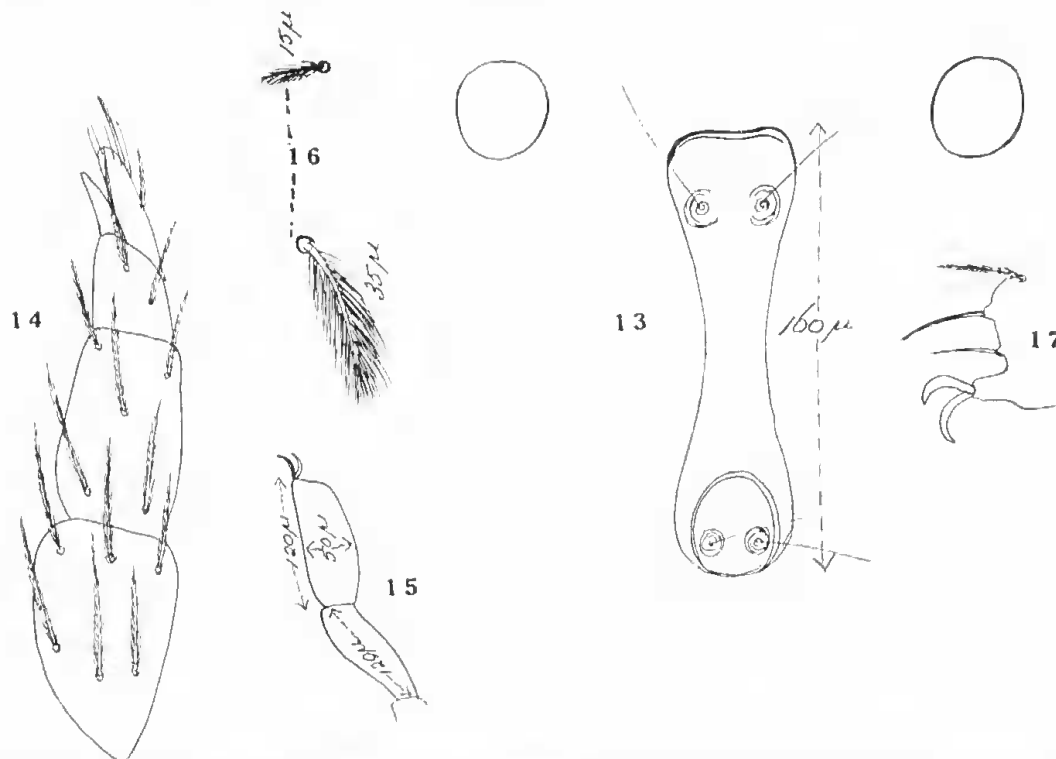


Fig. 13-17. *Myrmicotrombidium brevicristatum* n.g., n.sp.: 13, crista and eyes; 14, palp; 15, front tarsus and metatarsus; 16, dorsal setae of two sizes; 17, tip of tarsus and claw.

MICROTROMBIDIUM Haller, 1882.

This genus as it is represented in Australia is composed of the two subgenera *Enemotrombidium* and *Microtrombidium* s. str. It is particularly rich in species, no fewer than 19 being now listed for this continent.

MICROTROMBIDIUM Haller, 1882, s. str.

MICROTROMBIDIUM BARRINGUNENSE Hirst, 1928.

The type of this species was amongst the material left by Hirst, and is now deposited in the South Australian Museum. There is nothing further to add to

the original description (⁸), and the species may be identified by the key given in this paper.

MICROTROMBIDIUM WESTRALIENSE sp. nov.

Description: Closely allied to the preceding species. Size 1.2 mm. Body shape normal. Eyes two on each side, almost sessile (when first mounted the eyes were easily observed, but owing to displacement of the specimen they cannot now be seen, being hidden by the legs). Sensillary area of crista posterior in position. Nasal process wanting. Dorsal hairs uniform, long, $60\ \mu$, and feathered as in *M. barringtonense* Hirst. Ventral hairs similar but shorter and slightly stouter, $25\ \mu$. Palpal tibia with the usual terminal claw and its base on inside with two smaller accessory claws or spines much as in preceding species. Palpal tarsus not clubbed, barely reaching tip of claw. Tarsus of front legs elongate, sides slightly tapering towards apex, $200\ \mu$ long by $90\ \mu$ high, one-third as long again as metatarsus. Colour of animal in life red.

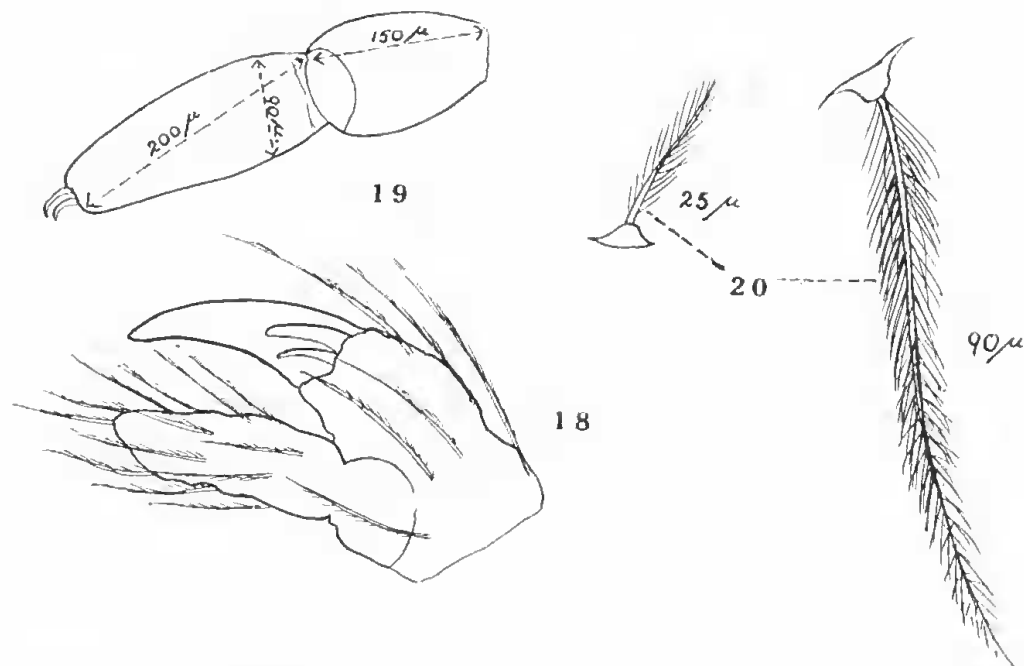


Fig. 18-20. *Microtrombidium westraliense* n.sp.: 18, palp; 19, front tarsus and metatarsus; 20, long and short dorsal setae.

Locality: Under stones at Mundaring, West Australia, August 9, 1931 (H.W.).

Type: In the South Australian Museum.

Remarks: This species differs from the preceding species in the presence of eyes and in the dimensions of the front tarsus.

MICROTROMBIDIUM MYRMICUM sp. nov.

Description: Size 0.8 mm. Body of normal shape, broadest across the shoulders. Eyes two on each side, sessile. Crista with posterior sensillary area. Dorsal hairs all of one type, leaf-like with short lateral hairlets, almost as broad as long, length $20\ \mu$. Palpal tibia with terminal and one accessory claw followed by four

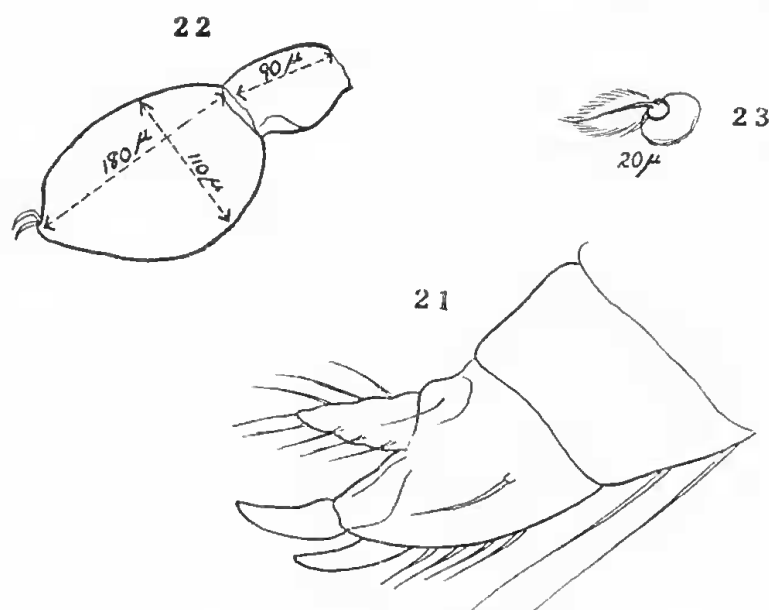


Fig. 21-23. *Microtrombidium myrmicum* n.sp.: 21, palp; 22, front tarsus and metatarsus; 23, one of the dorsal setae.

or five spines. Palpal tarsus small, not clubbed, and not reaching tip of claw. Tarsus of front leg short, elliptical, more than half as high as long, $110\ \mu$ by $180\ \mu$ respectively, twice as long as metatarsus. Colour in life light red.

Locality: With ants, Mundaring, West Australia, May 25, 1931 (H.W.).

Syntypes: In the South Australian Museum.

MICROTROMBIDIUM ATTOLUS (Banks, 1916).

Syn. *Rhyncholophus attolus* Banks, 1916.

The species described by Banks (²) as *Rhyncholophus attolus* is, like his species *R. retentus*, a member of the genus *Microtrombidium* s.l. The syntypes are in the South Australian Museum. Although Banks states that the eyes are two on each side it is not possible to see any in the remounted specimens. In the South Australian Museum collections were found two other specimens mounted dry on cards from the same locality, and although these have been cleared and mounted still no eyes are to be seen. As Banks was also wrong in his determina-

tion of the eyes in his other species it seems possible that he was also in error in this case. *Microtrombidium attolus* can be separated from all other species by the key. It comes closest to *M. barringtonense* Hirst, in the absence of eyes, but

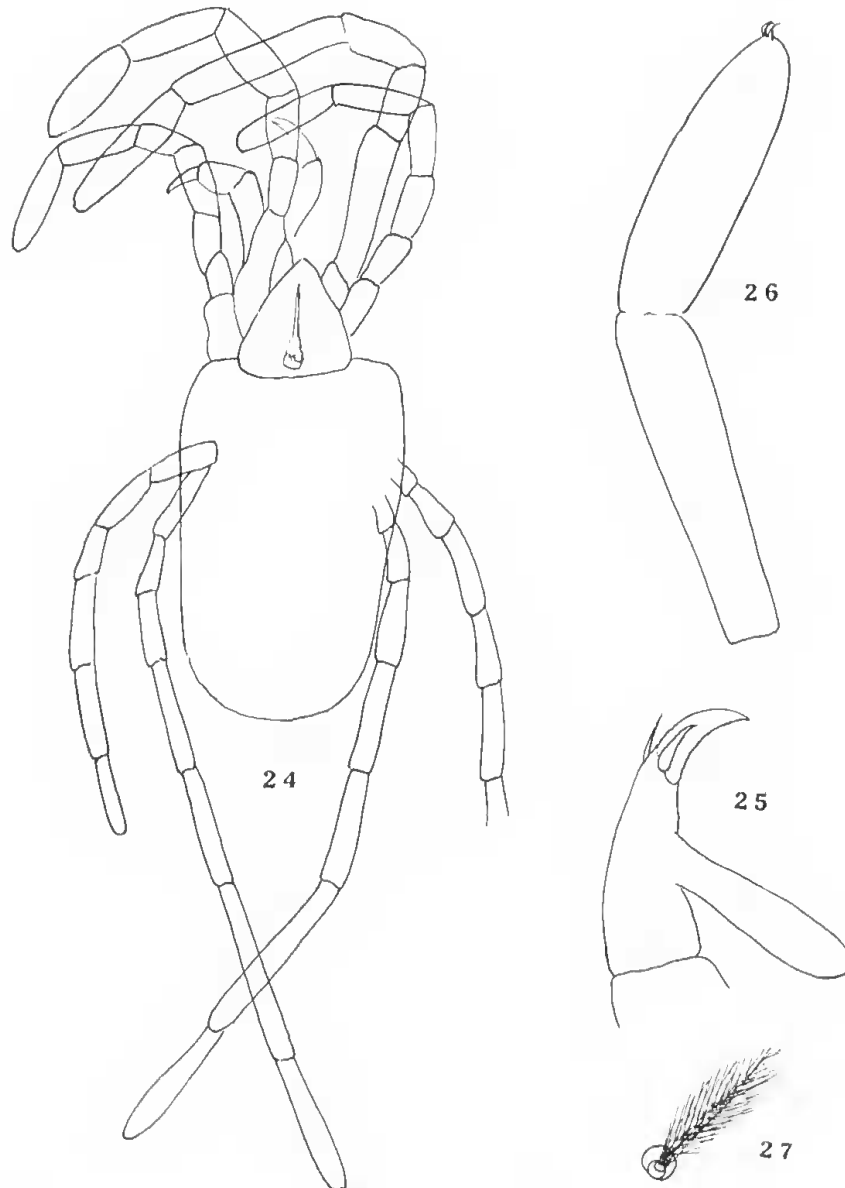


Fig. 24-27. *Microtrombidium attolus* (Banks): 24, entire animal in outline; 25, palp; 26, anterior tarsus and metatarsus; 27, dorsal seta.

differs from it in the proportions of the front tarsi and the number and structure of the dorsal body hairs. The mandibles are of the normal Trombid type, and not of the Erythaeid. An outline of the entire animal, and details of the palp, front tarsi, and dorsal hairs are given.

MICROTROMBIDIUM AEQUALIS (Banks, 1916).

Syn. *Trombidium aequalis* Banks, 1916.

The type of this species does not appear to be in the South Australian Museum, and was possibly not returned after determination. The original description and figures given by Banks (2) are extremely good, but the species is obviously a *Microtrombidium* and not a *Trombidium*. A single specimen taken by myself at Greenbushes, Western Australia, on August 28, 1931, is referred to this species.

MICROTROMBIDIUM PARANUM Hirst, 1928.

The type was amongst the Hirst material left in Adelaide, and is now in the South Australian Museum.

MICROTROMBIDIUM AFFINE Hirst, 1928.

Hirst's type is in the South Australian Museum, together with two specimens collected by myself at Adelaide in 1933.

In his description (3) Hirst refers to a small comb of teeth behind the apical and accessory claws of the palp. As the palp was mounted in a bad position for observing this comb, it has been remounted, and it can now be seen that the comb consists of a graduated series of teeth. In the presence of this comb and the shape of the front tarsus it differs markedly from *M. barringtonense* Hirst, with which the author contrasts it. From *M. paranum* Hirst it can be separated by the characteristic hairs of the dorsum.

MICROTROMBIDIUM KARRIENSIS sp. nov.

Description: Size 1.0 mm. Colour reddish. Body of normal shape. Eyes two on each side, sessile. Crista with posterior sensillary area. Dorsal hairs uniform, short, 35 μ , with long accessory hairlets, which are very much longer than those in the nearest species, *M. affine* Hirst. Palpal tibia with large claw, smaller accessory claw, and a series of 6-7 strong spines. Palpal tarsus not clubbed, long, and reaching tip of claw. Tarsus of front leg elliptical, less than twice as long as high, 270 μ by 155 μ respectively, metatarsus short, as long as tarsus is high. Front legs as long as body.

Locality: Denmark, West Australia, July 6, 1932 (H.W.).

Type: In the South Australian Museum.

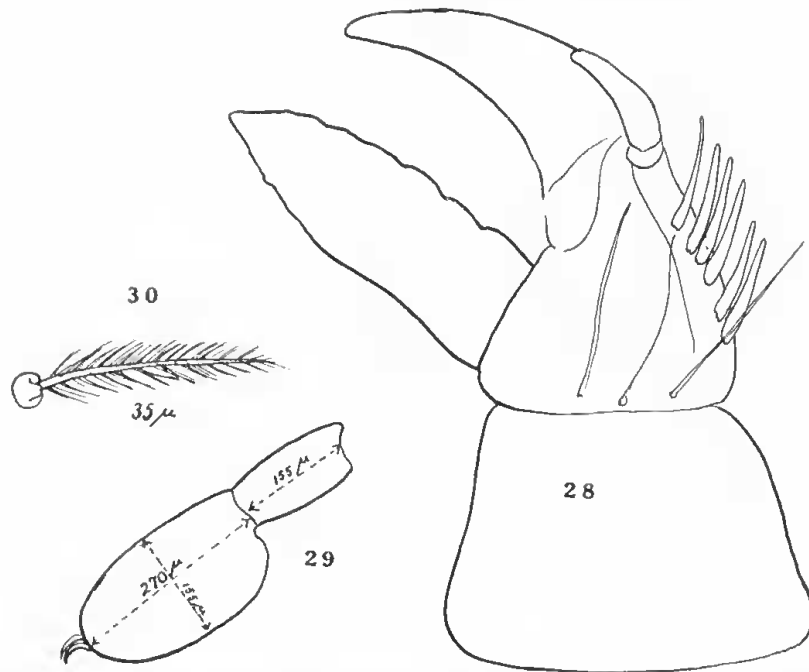


Fig. 28-30. *Microtrombidium karriensis* n.sp.: 28, palp; 29, front tarsus and metatarsus; 30, dorsal seta.

MICROTROMBIDIUM SPINATUM sp. nov.

Description: Length 1.4 mm. Colour reddish. Crista in the type specimen indeterminate owing to displacement. Eyes similarly indeterminate. Palpi as figured, with one large accessory tooth after the claw, followed by two large spine-like setae. Palpal tarsus clubbed but not reaching tip of claw. Legs all shorter than the body, front tarsus 270 μ long by 135 μ high, metatarsus 190 μ long. Body hairs very numerous, spine- or rod-like, with only small, fine, and indistinct adjacent hairlets, length of spines somewhat variable in length, from 50 μ to 150 μ , but mostly the latter, and all of the same type.

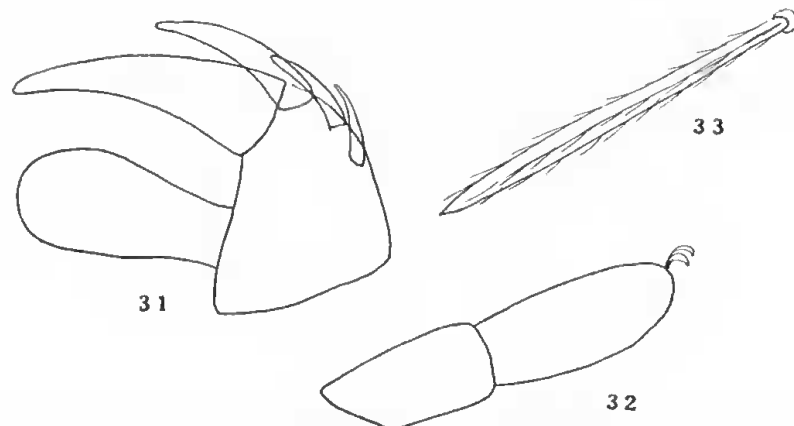


Fig. 31-33. *Microtrombidium spinatum* n.sp.: 31, palp; 32, front tarsus and metatarsus; 33, dorsal seta.

Locality: Glen Osmond, South Australia, October 1, 1933 (H.W.).

Type: In the South Australian Museum.

Remarks: This species comes very close to *M. (Enemathrombium) victoriense* sp. nov., but differs in that the dorsal hairs are of uniform type.

ENEMATHROMBIUM Berlese, 1912.

MICROTROMBIDIUM (ENEMATHROMBIUM) RETENTUS (Banks, 1916).

The syntypes of this species are in the South Australian Museum. Hirst in 1928 (?) pointed out that this species belonged to the Trombidiidae, and not to the Erythraeidae, in which it was placed by Banks. As the specimens have been

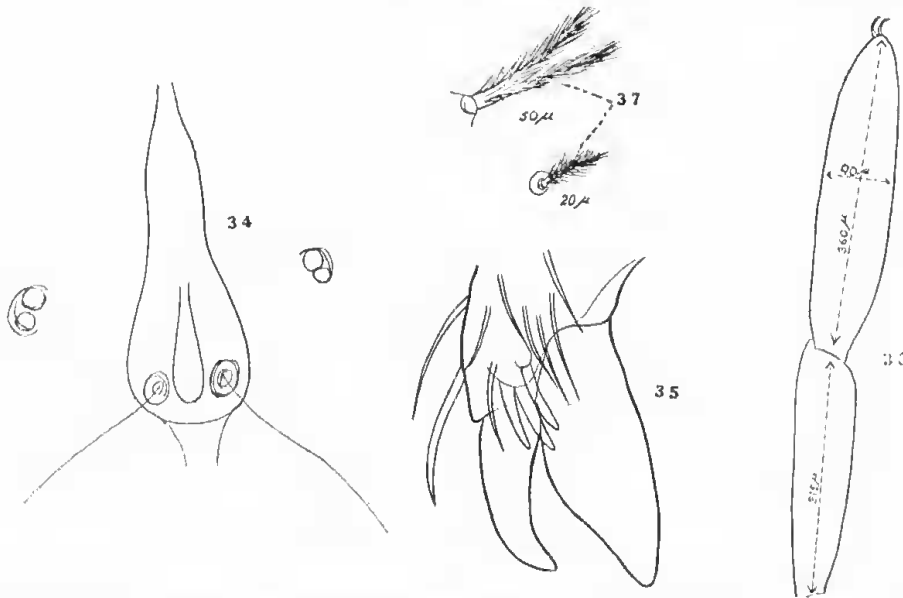


Fig. 34-37. *Microtrombidium (Enemathrombium) retentus* (Banks): 34, crista and eyes; 35, palp; 36, front tarsus and metatarsus; 37, larger and smaller dorsal setae.

remounted for further examination it can now be definitely placed in the subgenus *Enemathrombium* of *Microtrombidium*. The following additional details can be given. Eyes two on each side (not one, as stated by Banks), sessile. The dorsal body hairs are of two kinds, a longer type $50\ \mu$ long, fairly thick, and somewhat clavate distally (in many the distal portion is bi- or even tri-furcate). The smaller hairs are short, fairly thick, not distinctly pointed apically, and with long hairlets. The palpal tibia has the usual claw and three or four stout spines behind (cf. fig.). The palpal tarsus is large, tapering distally, and overreaching tip of claw. The tarsus of front legs is elongate, parallel-sided, and four times as long as high, $360\ \mu$ and $90\ \mu$ respectively, metatarsus $315\ \mu$ long.

MICROTROMBIDIUM (ENEMOTROMBIUM) ADELAIDICUM sp. nov.

Description: Size 1.0 mm. Colour red. Body of normal shape, broadest across shoulders. Eyes two on each side, sessile. Crista with sensillary area at about one-third from posterior end. Dorsal hairs of two kinds, a larger type 50 μ long, scattered evenly over the whole surface, with long hairlets, and although with parallel sides rather pointed at the apex. The shorter hairs are only 20 μ long and pointed, with long hairlets. Palpal tibia with usual claw

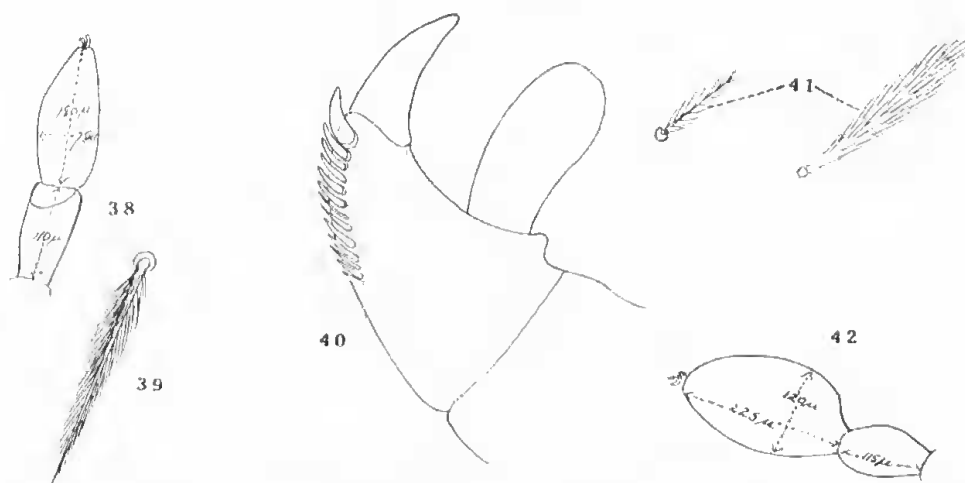


Fig. 38-39. *Microtrombidium (Enemotrombium) adelaidicum* n.sp.: 38, front tarsus and metatarsus; 39, long dorsal hair. Fig. 40-42. *Microtrombidium (Enemotrombium) newmani* n.sp.: 40, palp; 41, long and short dorsal hairs; 42, front tarsus and metatarsus.

followed by accessory claw, then a series of 10-13 strong spines. Palpal tarsus not clubbed. Tarsus of front leg elliptical, more than twice as long as high, 180 μ and 75 μ respectively, slightly more than half as long again as metatarsus.

Locality: In ants' nest, Glen Osmond, South Australia, September 10, 1933 (H.W.).

Syntypes: In the South Australian Museum.

MICROTROMBIDIUM (ENEMOTROMBIUM) NEWMANI sp. nov.

Description: Size 1.0 mm. Colour red. Body of normal shape. Eyes two on each side, sessile. Crista with posterior sensillary area. Dorsal body hairs of two types, the longer ones clavate, with numerous hairlets, 70 μ long, the shorter ones 20 μ long, with fairly long hairlets. Palpal tibia with normal claw followed by a graduated series of spines. Palpal tarsus clubbed, much longer than and overreaching tip of claw. Front tarsus elliptical, 225 μ long by 120 μ high, twice as long as metatarsus. Front legs shorter than body.

Locality: Bedford-dale, West Australia, November 29, 1932 (H.W.).

Type: In the South Australian Museum.

This species is named in honour of Mr. L. J. Newman, Government Entomologist of West Australia.

MICROTROMBIDIUM (ENEMOTROMBIUM) KOORDANUM Hirst, 1928.

The type of this species was found amongst the Hirst material in Adelaide, and is now in the South Australian Museum.

MICROTROMBIDIUM (ENEMOTROMBIUM) SIMILE Hirst, 1928.

The type material of this species, taken by Hirst in the National Park, Belair, South Australia, was amongst the material left in Adelaide, and is now in the South Australian Museum. In the National Museum, Sydney, are three specimens in spirit, and a slide of the chelicerae and palpi, the locality for which is Myall Lakes, New South Wales (A. Minsgrave, 1922).

MICROTROMBIDIUM (ENEMOTROMBIUM) COLLINUM Hirst, 1928.

Hirst's type was also amongst the material left in Adelaide, and is now in the collections of the South Australian Museum.

MICROTROMBIDIUM (ENEMOTROMBIUM) WYANDRAE Hirst, 1928.

The type, found amongst his Adelaide material, is now in the South Australian Museum.

MICROTROMBIDIUM (ENEMOTROMBIUM) VICTORIENSE sp. nov.

Description: Length 2.6 mm. Colour red. Eyes two on each side, sessile. Crista with posterior sensillary area and with a row of strong setae on each side of anterior portion. Front tarsus two and a half times as long as high and one-fourth as long again as metatarsus. Palpal tibia with strong terminal claw, an outer claw at base of this, and another claw inside. There are also two distinct series of spine-like setae on the outside of the palpal tibia. Palpal tarsus slightly overreaching tip of claw, not clubbed. Dorsal body hairs of two forms; some very long and spine-like, 200 μ , with very faint indications of small lateral hairlets; others very small and stout, pointed apically, and with hairlets as long as hairs are wide, 20–25 μ long, with bare apex.

Remarks: The type of this species, originally in my collection, and now in the South Australian Museum, was collected by Mr. H. G. Andrewartha at Sassafras, Victoria, in 1931. Amongst the Hirst material left in Adelaide an un-

named preparation, labelled "Mount Gambier, S.A.", without date, can be referred to this species. This preparation is now in the South Australian Museum.

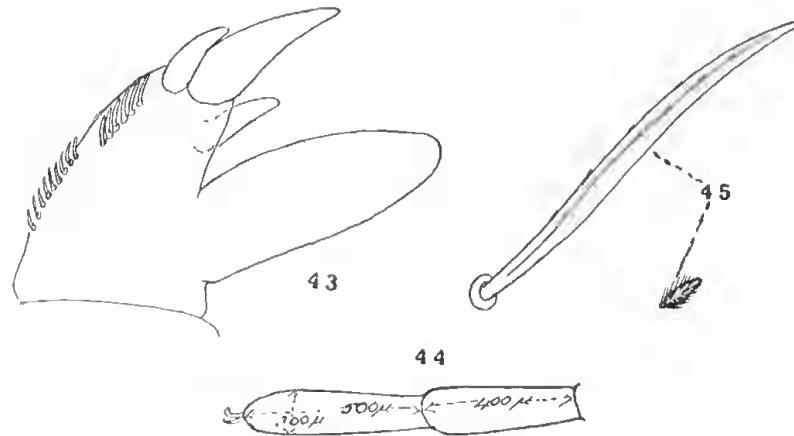


Fig. 43-45. *Microtrombidium (Enemothrombium) victoriense* n.sp.: 43, palp; 44, front tarsus and metatarsus; 45, long and short dorsal hairs.

MICROTROMBIDIUM (ENEMOTHIROMBIUM) HIRSTI sp. nov.

Description: Length 1.2 mm. Colour ?. Eyes two on each side, sessile. Crista normal for the genus. Palpi ? (missing in preparation). Front tarsus half as long again as metatarsus and less than three times as long as high. Longer dorsal hairs somewhat cup-shaped, but widening gradually from the base to apex, not sharply expanded as in *M. (E.) simile* Hirst, 60 μ long; smaller hairs cup-shaped, with longer hairlets than in *M. (E.) simile* Hirst, 15-20 μ long.

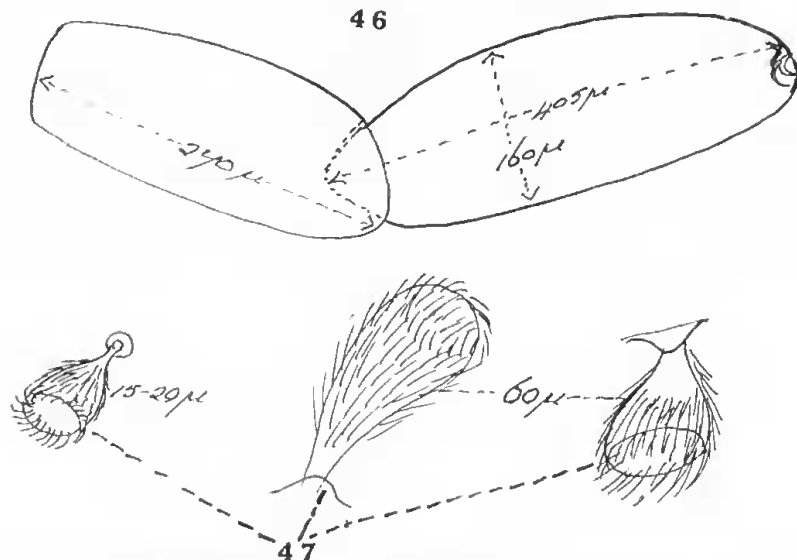


Fig. 46-47. *Microtrombidium (Enemothrombium) hirsti* n.sp.: 46, front tarsus and metatarsus; 47, dorsal hairs.

Remarks: This species is closely related to *M. (E.) simile* Hirst, but differs mainly in the shape of the longer body hairs and in the dimensions of the front tarsus and metatarsus. The type specimen is one found amongst the Hirst material left in Adelaide, and now in the South Australian Museum. It had been labelled *Allothrombium insigne* Hirst in Hirst's writing, but this had been later crossed out in pencil. The locality was Myall Lakes, New South Wales, September, 1922 (A. Musgrave).

MICROTROMBIDIUM (ENEMOTROMBIUM) SOUTHCOTTI sp. nov.

Description: Length 1.4 mm. Colour in life red. Crista well developed and characteristic of the genus, 245 μ long, with large posterior area which is fur-

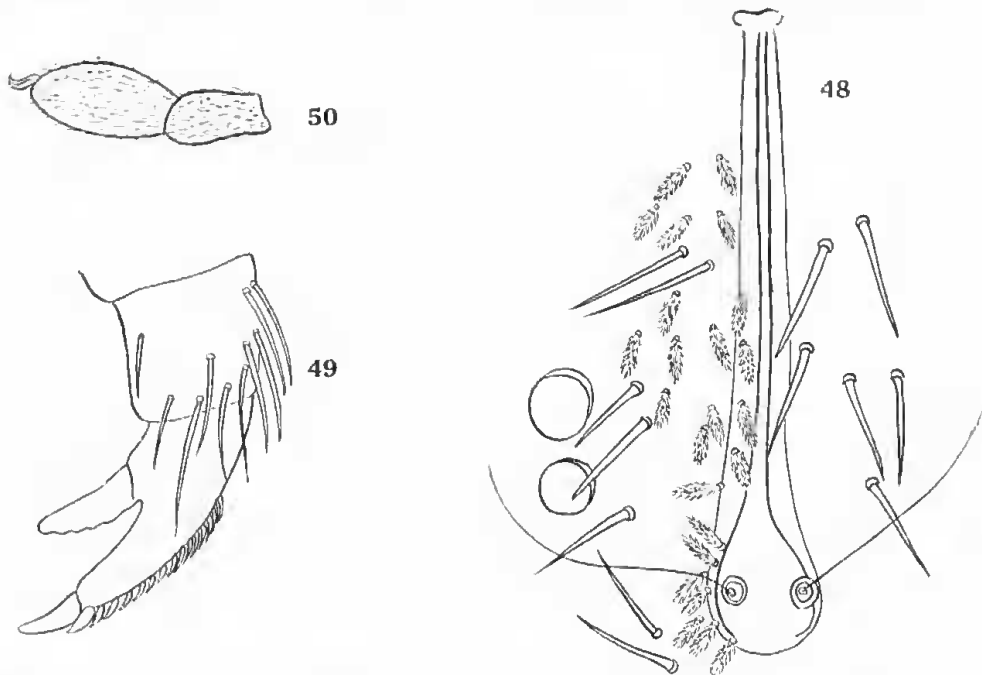


Fig. 48-50. *Microtrombidium (Enemotrombium) southcotti* n.sp.: 48, crista and right eyes; 49, palp; 50, front tarsus and metatarsus.

nished with the usual two sensillary hairs 100 μ long. Eyes, two on each side, sessile, posterior eyes somewhat smaller than the anterior. Palpi as figured, with a fairly strong apical tibial claw followed by a series of teeth on the outer edge which are graduated, gradually becoming spine-like. Legs shorter than body, II and III shorter than I and IV, front tarsus elliptical, 200 μ long by 100 μ high, metatarsus 125 μ long. Clothing of long spines, which are slightly ciliated and 80-82 μ long, and many short ciliated scales 25 μ long. These are parallel-sided, blunt at the tip, and with rather long hairlets. Leg hairs fine, pointed, and ciliated.

Type: A single specimen collected by Mr. R. V. Southcott at Belair, South Australia, January, 1934.

Remarks: This species is very closely related to *M. (B.) victoriense* sp. nov., but differs markedly in the smaller dorsal hairs and in the dimensions of the front tarsus.

KEY TO THE AUSTRALIAN SPECIES OF MICROTROMBIDIUM.

1. Dorsal body hairs of only one type, unmodified 2.
 Subgenus *Microtrombidium* Haller s. st.
 Dorsal body hairs generally of two types, often strongly modified, cup-shaped, bulbate, spine-like or otherwise 9.
 Subgenus *Encmothrombidium* Berlese.
2. Eyes wanting 3.
 Eyes present, two on each side, sessile 4.
3. Front tarsi four times as long as high. Palpal tarsus clubbed. Dorsal body hairs relatively fewer and stouter and not so long (cf. fig.). Palpal tibia with 3 accessory claws. Legs IV much longer than body. *M. attolus* (Banks).
 Front tarsus four times as long as high. Dorsal body hairs more numerous (cf. fig.), longer, and more slender. Palpal tibia with 2 or 3 accessory claws. Legs IV only slightly longer than the body *M. barringtonense* Hirst.
4. Front tarsus elongate, almost parallel-sided, slightly more than twice as long as high. Palpal tarsus not clubbed. Crista with posterior area.
 *M. westraliense* sp. nov.
 Front tarsus elliptical, not parallel-sided 5.
5. Body hairs short and broad, leaf-like, with lateral hairlets. Front tarsus twice as long as metatarsus, slightly more than half as long again as high. Accessory claw of palpal tibia as large as claw and followed by 4 or 5 spine-like setae *M. myrmicum* sp. nov.
 Body hairs not as above 6.
6. Hairs on dorsum short, stout, oval and pointed, with short hairlets. Front tarsus twice as long as high. Palpal tibia with one accessory claw followed by a more or less irregular group of strong setae. Palpal tarsus clubbed.
 *M. parvum* Hirst.
 Dorsal body hairs not as above 7.
7. Dorsal body hairs rod- or spine-like, numerous, with only indistinct, close-lying hairlets. Front tarsus twice as long as high. *M. spinatum* sp. nov.
 Dorsal hairs not as above 8.
8. Front tarsus slightly more than 3 times as long as high and much longer than metatarsus. Hairs of dorsum as figured by Banks. Palpal tarsus not clubbed.
 *M. aequalis* (Banks).
 Front tarsus $2\frac{1}{2}$ times as long as high, metatarsus nearly as long. Palpal tibia with one accessory claw followed by a series of graduated spine-like setae. Body hairs slender and delicate *M. affine* Hirst.

- Front tarsus less than twice as long as high, metatarsus as long as tarsus is high. Palpal tibia with accessory claw and a series of six stout setae. Palpal tarsus not clubbed *M. karriensis* sp. nov.
9. Larger dorsal hairs cup-shaped 10.
Larger dorsal hairs not cup-shaped 13.
10. Smaller dorsal hairs cup-shaped, with minute denticles 11.
Smaller dorsal hairs not cup-shaped 12.
11. Larger dorsal hairs with stem suddenly expanding to form the cup. Front tarsus $3\frac{1}{2}$ times as long as high *M. (E.) simile* Hirst.
Larger dorsal hairs with stem gradually expanding from base to cup. Front tarsus less than 3 times as long as high *M. (E.) hirsti* sp. nov.
12. Smaller body hairs very irregular, usually with small lateral processes. Front tarsus more than 4 times as long as high *M. (E.) wyandrac* Hirst.
Smaller body hairs more regular, rod-like. Front tarsus more than 3 times as long as high *M. (E.) collinum* Hirst.
13. Longer dorsal hairs either branched distally, bushy, or ending in two scale-like or leaf-like halves. Front tarsus twice as long as high. *M. (E.) koordatum* Hirst.
Longer dorsal hairs otherwise 14.
14. Longer dorsal hairs very long and spine-like 15.
Not so 16.
15. Smaller dorsal hairs tapering to a point with comparatively short hairlets. Long hairs with only indistinct ciliations, 200 μ long. Front tarsus two and a half times as long as high and one-fourth as long again as metatarsus. *M. (E.) victoriense* sp. nov.
Small dorsal hairs not tapering, blunt at apex, and with relatively long hairlets. Longer dorsal hairs only 80–82 μ in length. Front tarsus twice as long as high and almost twice as long as metatarsus *M. (E.) southcotti* sp. nov.
16. Front tarsus elongate, parallel-sided, 4 times as long as high. Body hairs relatively short, the longer ones bi- or tri-furcate apically. *M. (E.) relentus* (Banks).
Front tarsus elliptical 17.
17. Longer dorsal hairs clavate with long hairlets. Front tarsus less than twice as long as high and twice as long as metatarsus *M. (E.) newmani* sp. nov.
Longer body hairs, not clavate although parallel-sided, with short hairlets. Front tarsus more than twice as long as high, and about half as long again as metatarsus *M. (E.) adalaidicum* sp. nov.

TROMBICULA Berlese, 1905.

TROMBICULA SIGNATA sp. nov.

Description: Length 1.2 mm. Colour in life probably red. Crista and sensillary area as in genus (cf. fig.). Eyes one on each side, large, and placed close

to but slightly posterior of the sensillary area. Front tarsus two and a half times as long as high and one-third as long again as metatarsus. Palpal tibia with the usual apical claw and two accessory claws as well as a number of strong setae. Palpal tarsus stout, hardly clubbed, and not quite reaching tip of claw. Body hairs of one type as figured and $40\ \mu$ in length.

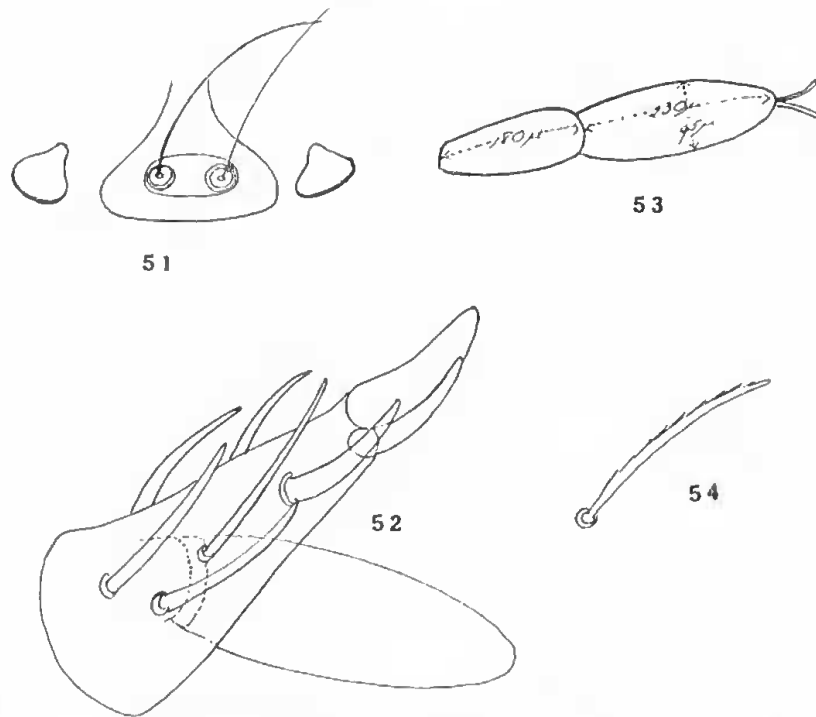


Fig. 51-54. *Trombicula signata* n.sp.: 51, sensory hairs and eyes; 52, palp; 53, front tarsus and metatarsus; 54, dorsal hair.

Type: A single specimen collected by myself in Western Australia in 1931, precise locality uncertain, but probably Perth district. The preparation is in the South Australian Museum.

CAENOTHROMBIUM Oudemans, 1928.

In this genus the crista is entire, with a medial sensillary area, a thick posterior stem, and a broad, somewhat Y-shaped anterior plate much wider than the sensillary area. The anterior margin of this frontal plate is straight or only slightly sinuate. In Oudemans' drawings the centre of this plate is shown as unchitinized, the arms of the Y being joined by an anterior transverse band or rod. In the Australian species which I refer to this genus the whole of the plate is more or less chitinized and the anterior margin a little more sinuate. The tarsi are without pulvilli or pseudopulvillar hairs. The eyes are two on each side and pedunculate as in *Allothrombium*.

To this genus I would refer all those species placed by Hirst in *Dinothrombium* Oudemans (= *Trombidium* Berlese, 1912, nec. Fabr., 1893). In all specimens available of Hirst's types the crista has been dissected and examined. They have all been found to conform to that described by Oudemans for *Caenothrombium*. The name *Dinothrombium* is now used for *Trombidium* (Fabr., 1893 nec. 1775) Berlese, 1912, and *Sericothrombium* Berlese, 1910, has been replaced by *Trombidium* Fabr., 1775.

In his paper (13) Oudemans on page 81 compares his genus *Xenothrombium* to *Dinothrombium* as follows: "Die Crista ist nicht in drei Teile geteilt. *Dinothrombium* wird also beiseite geschoben". Yet, in his key to the genera of Trombidiidae in the same paper (page 90) he places *Dinothrombium* in the section "Gl. Crista ungeteilt". This is obviously an error, for *Dinothrombium* (*Trombidium* Berlese) has three distinct parts to the crista, as is distinctly shown by Berlese's figure (Trombidiidae. Redia, 1912). In *Caenothrombium* the crista is entire, except in so far as the anterior plate can be considered a distinct part. In *Dinothrombium* the anterior portion is also plate-like, but of an entirely different shape. Furthermore, the tarsi in *Dinothrombium* are furnished with a small cluster of hairs at the tip, forming a kind of pseudopulvillus, as is described later for the genus *Austrothrombium* gen. nov.

CAENOTHROMBIUM SERICATUM (Rainbow, 1906).

Syn. *Trombidium sericatum* Rainbow, 1906.

Dinothrombium splendidum Hirst, 1928.

Dinothrombium ventricosum Hirst, 1928.

Of this species I have been able to examine Rainbow's type material in the Australian Museum. This consists of 8 specimens of rather varying sizes, the largest being a gravid female of about 4.5 mm. in length, the others much smaller. The type of Hirst's *D. splendidum* is in the South Australian Museum, and consists of three microscopic slides of various parts. There is also a mount of the front leg of another example from Mullewa, West Australia, in the same collection; while a mount of the palp of this specimen was found amongst the Hirst material left in Adelaide. The type material of *D. ventricosum* Hirst, consisting of three slides of the palp, first leg and cephalic area, is in the Australian Museum.

A careful study of the above material reveals no essential differences between the three species, and they are therefore regarded as synonymous. In Rainbow's description there are distinct errors, the most important being his statement that

the eyes, two on each side, are sessile. Actually they are placed on distinct elongated peduncles, as in other members of the genus.

The following additional characters are taken from one of his specimens: front tarsus parallel-sided, 4·8 times as long as high, 670 μ by 140 μ , metatarsus 500 μ long. Eyes two on each side, pedunculate. Dorsal body hairs uniform, 90 μ long, with parallel sides, stout and blunt at tip. Palpi as in genus. Crista as figured.

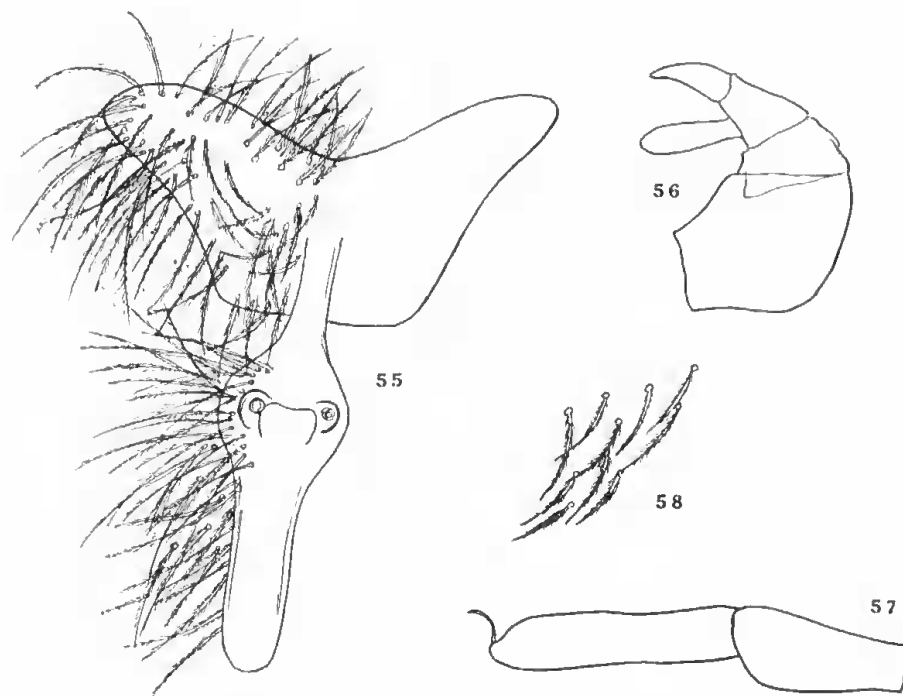


Fig. 55-58. *Caenothrombium sericatum* (Rainbow): 55, crista; 56, palp; 57, front tarsus and metatarsus; 58, posterior dorsal setae.

In the above details it will be noticed that the tarsus is somewhat longer in proportion to its height than given by Hirst for *D. splendidum*, but the use of this character must not be pressed too far. The body hairs are also rather longer than in *D. splendidum*, 60 μ , but are otherwise similar.

CAENOTHROMBIUM AUGUSTAE (Hirst, 1928).

Syn. *Dinothrombium augustae* Hirst, 1928.

This is one of the more easily distinguished species (cf. Key). The type is in the South Australian Museum.

CAENOTHROMBIUM TORRIDUM (Hirst, 1928).

Syn. *Dinothrombium torridum* Hirst, 1928.*Dinothrombium taylori* Hirst, 1928.

The type of *D. torridum* is in the South Australian Museum, while among the Hirst material left in Professor Harvey Johnston's possession were two mounts of the cuticle and chelicerae of *D. taylori*. The remainder of the latter species I have not been able to obtain, but from a study of what is available there appears to be no essential differences between the two forms. Four other specimens from Adelaide, South Australia, in May, 1933, and two from Waroona, West Australia, in November, 1931, all collected by myself, can be referred to this species.

CAENOTHROMBIUM MONTIVAGUM (Hirst, 1928).

Syn. *Microthrombidium montivagum* Hirst, 1928.*Dinothrombium montivagum* Hirst, 1929.*Dinothrombium rainbowi* Hirst, 1928.

This species was originally placed in the genus *Microthrombidium* (⁹), but later Hirst removed it to *Dinothrombium* (¹⁰). The type specimen, minus one of its front legs, is in the Australian Museum. The missing leg was found as a mount amongst the material left by Hirst in Adelaide. The type of *D. rainbowi* is also in the Australian Museum. It is undoubtedly synonymous with *montivagum*, which has slight page priority.

A single specimen collected by myself at Mullewa, West Australia, in 1931, and another from Buckland Park, South Australia, in August, 1933, are to be referred to this species. These specimens are now in the South Australian Museum.

CAENOTHROMBIUM CRASSUM (Hirst, 1928).

Syn. *Dinothrombium crassum* Hirst, 1928.

The type is in the South Australian Museum collections, while a mount of a piece of the cuticle was amongst the Hirst material.

CAENOTHROMBIUM NOBILE (Hirst, 1928).

Syn. *Dinothrombium nobile* Hirst, 1928.

The type is in the South Australian Museum, and a piece of the cuticle was amongst the Hirst material.

CAENOTHROMBIUM ALBUM sp. nov.

Description: Size small, 1.65 mm. in length, 1.2 mm. wide at widest point. Anterior legs longer than body, 3.0 mm., posterior legs 2.25 mm. Colour bright red, with a large white patch on each side of the posterior portion of the broad part of the body, and another, less defined, at apex of body. Legs yellowish. Palpal tibia with strong but comparatively short claw. palpal tarsus elongate and

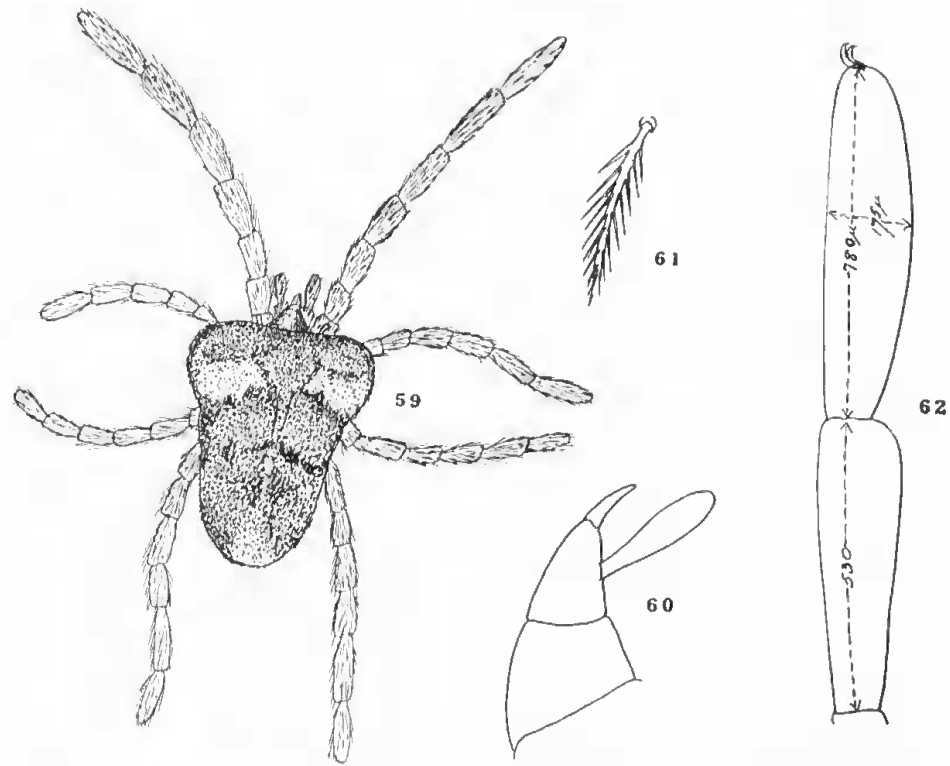


Fig. 59-62. *Caenothrombium album* n.sp.: 59, entire animal; 60, palp; 61, dorsal seta; 62, front tarsus and metatarsus.

clubbed and very much overreaching claw. Front tarsus elongate, four and a half times as long as high, metatarsus three-fourths the length of tarsus. Front tarsus 780 μ by 175 μ , metatarsus 530 μ long. Hairs of uniform type, slender and tapering, slightly curved, with long hairlets, 60 μ long. Eyes two on each side, pedunculate. Crista normal for this genus.

Syntypes: Adelaide, 1933, in the South Australian Museum. Other specimens from Denmark, West Australia, in July, 1932 (H.W.), and Riverton, South Australia, 1933 (H.W.).

CAENOTHROMBIUM NYNGANENSE (Hirst, 1928).Syn. *Dinothrombium nynganense* Hirst, 1928.

The syntype material of this species was amongst the Hirst preparations left with Professor Harvey Johnston, and is now in the South Australian Museum.

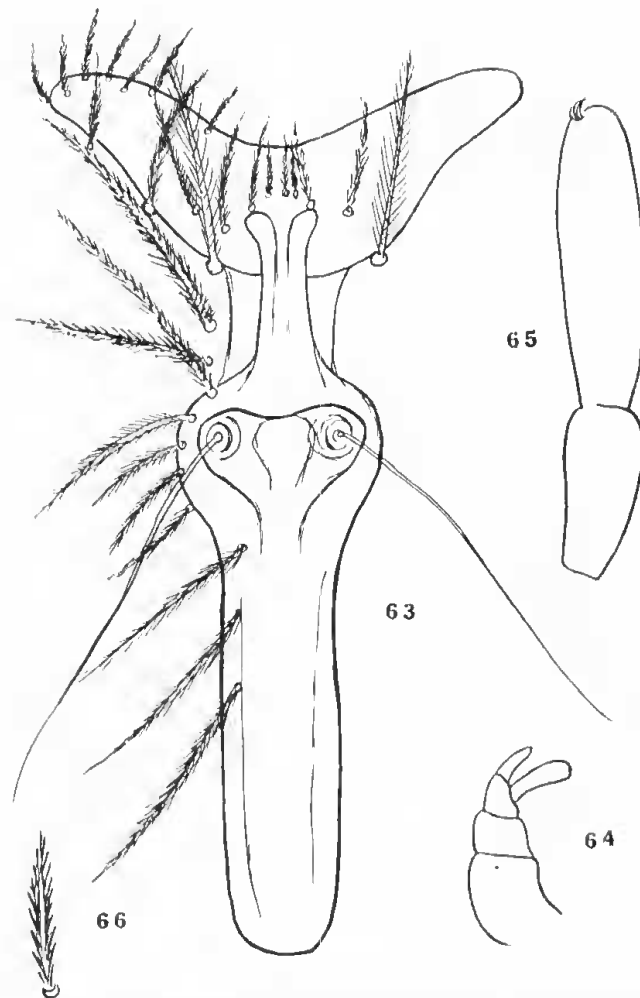


Fig. 63. *Caenothrombium nynganense* (Hirst): crista. Fig. 64-66. *Caenothrombium miniatum* n.sp.: 64, palp; 65, front tarsus and metatarsus; 66, dorsal seta.

In life this species has the white dorsal patches as in the preceding, but they are not so well defined.

It is apparently a fairly common and widely distributed species, and in the South Australian Museum are examples from the following localities:

Two, Adelaide, 1933 (H.W.); a nymph, Mullewa, West Australia, September, 1931 (H.W.); five, Dyne Swamp, Narracoorte, South Australia, September, 1933 (D.C.S.); one, Glen Osmond, South Australia, 1933 (H.W.). There is

also a specimen in the Australian Museum collection collected in the National Park, New South Wales, October, 1933 (A. Musgrave).

CAENOTHROMBIUM MINIATUM sp. nov.

Description: Length 1.5 mm. Colour in life red. Crista present and of the *Caenothrombium* type, 200 μ long. Eyes two on each side, pedunculate. Legs I and IV 1,575 μ long, II and III 1,225 μ long. Palpi normal, as figured, with slightly clubbed tarsus overreaching the tip of claw. Front tarsus long and rather parallel-sided, 470 μ long by 120 μ high, metatarsus 235 μ long. Clothing dorsally of uniform stout and blunt setae which are strongly ciliated; these setae are much stouter than in *C. nynganense* and not so numerous. Length of setae 35 μ .

Type: From moss, Belair, South Australia, May 18, 1933 (R.V.S.); in the South Australian Museum.

Remarks: This species is closely related to *C. torridum* (Hirst) and *C. nynganense* (Hirst). From the former it differs in size and in the dorsal body hairs, from the latter in size, in the dimensions of the front tarsi, and in the dorsal body hairs.

KEY TO THE AUSTRALIAN SPECIES OF CAENOTHROMBIUM.

1. Dorsal body hairs of two distinct sizes. Front tarsus 3 times as long as high, 425 μ long .. *C. montivagum* (Hirst), syn. *D. rainbowi* Hirst.
Dorsal body hairs uniform 2.
2. Front tarsus very elongate, about 7 times as long as high. Length of animal 2.4 mm. *C. augustae* (Hirst).
Front tarsus much shorter, not exceeding about 4½ times as long as high 3.
3. Front and hind legs much longer than body. Front tarsus 4½ times as long as high, 780 μ by 175 μ . A large, well-defined white patch on each side of broadest portion of body and another at apex .. *C. album* sp. nov.
Front and hind legs scarcely longer than body 4.
4. Smaller species not exceeding 4.0 mm. in length 5.
Larger species more than 4.0 mm. in length 6.
5. Front tarsus 4–4½ times as long as high. Dorsal body hairs 60–90 μ long, slender, tapering, with long hairlets.
C. torridum (Hirst), syn. *D. taylari* Hirst.
Front tarsus almost 4 times as long as high. Dorsal body hairs stout, blunt, and strongly ciliated, 35 μ long. *C. miniatum* sp. nov.
Front tarsus 2½ times as long as high. Body hairs fairly stout and reaching 65 μ in length *C. nynganense* (Hirst).

6. Posterior dorsal hairs short and stout, parallel-sided, with short hairlets, often slightly swollen distally, 50–60 μ long, and slightly curved. Front tarsus $4\frac{1}{2}$ times as long as high.

C. sericatum (Rainbow), syn. *D. splendidum* Hirst, *D. ventricosum* Hirst.

Posterior dorsal hairs longer and straighter, 75 μ long, more tapering, and never swollen distally. Front tarsus 3 times as long as high. *C. crassum* Hirst.

Posterior body hairs longer still, 150 μ , slightly curved, more tapering and delicate. Front tarsus $3\frac{1}{2}$ times as long as high. . . . *C. nobile* (Hirst).

AUSTROTHROMBIUM gen. nov.

This new genus is characterized by the peculiar shape of the anterior plate of the crista. This plate is very much broader than the median sensillary area, and has its anterior margin very deeply excised and the lateral margins sloping strongly inwards and backwards, so that the plate appears to consist largely of two forwardly directed prongs. The crista is entire, with a moderately thickened posterior stem. The tarsi are without a true pulvillus, but have a number of hairs, some 5 or 6, which form a kind of pseudopulvillus. This is similar to that figured by Berlese (Redia, 1912, p. 6, fig. 1b) for *Dinothrombium* (*Trombidium*). In *Dinothrombium* the anterior plate is straight-sided and the anterior margin is only sinuate; the crista also is divided behind the sensillary area, so that if the anterior plate is regarded as a separate part it can be said to be divided into three parts.

In this genus I place Hirst's *Allothrombium* (*Mesothrombium*) *australiense*, *A. (M.) insigne*, and *A. (M.) koudinicum*. One might have kept Hirst's name *Mesothrombium* for this genus but that the genotype of *Mesothrombium* is *A. (M.) antipodianum* Hirst, which is a true *Allothrombium*, and not congeneric with the other three species.

AUSTROTHROMBIUM AUSTRALIENSE (Hirst, 1929).

Syn. *Allothrombium* (*Mesothrombium*) *australiense* Hirst, 1929.

The two syntypes of this species are in the Australian Museum. In addition to the spirit material two preparations of the front leg and the palp exist, and I have made further mounts of the crista and a portion of the cuticle.

Hirst (¹⁰) states that this species is closely related to *Allothrombium antipodianum* Hirst, but a study of the generic characters will show that this is not the case.

AUSTROTHROMBIUM INSIGNE (Hirst, 1928).

Syn. *Allothrombium* (*Mesothrombium*) *insigne* Hirst, 1928.

The type is in the Australian Museum. This species is very closely related to the above, and although a study of the available material confirms all Hirst's minute differences it seems to me doubtfully more than a variety. The palpal tarsus is slightly longer in proportion to its height than in *A. australiense* and there are small differences in the structure of the dorsal hairs.

AUSTROTHROMBIUM KONDINIUM (Hirst, 1928).

Syn. *Allothrombium* (*Mesothrombium*) *antipodinum* v. *kondinium* Hirst, 1928.

Allothrombium (*Mesothrombium*) *kondinium* Hirst, 1929.

The type, which I have not been able to see, is in the Perth Museum, West Australia. Other examples, however, which I refer to this species have been

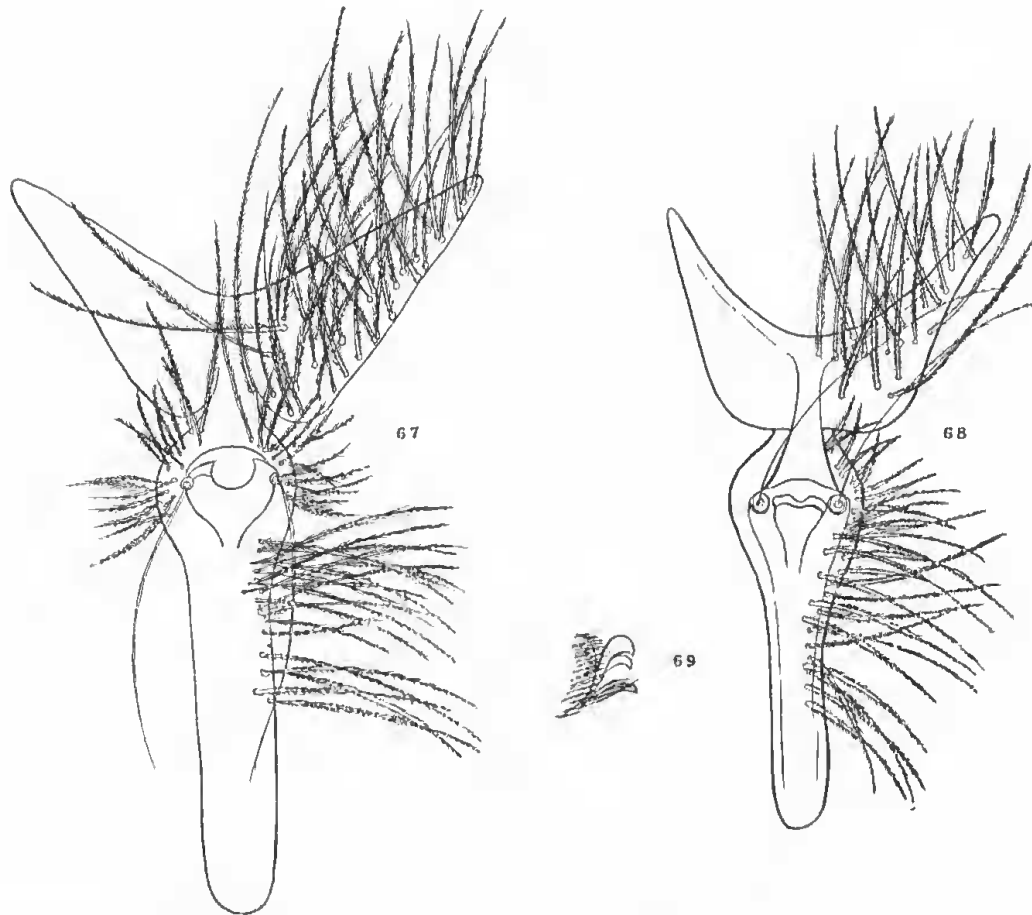


Fig. 67. *Austrothrombium australiense* (Hirst): crista. Fig. 68-69. *Austrothrombium kondinium* (Hirst): 68, crista; 69, tip of second tarsus.

collected by myself from the following localities: Armadale, West Australia, July, 1931; Mullewa, West Australia, September, 1931, and in the Porongorups, West Australia, in September, 1932.

The following details are taken from the Mullewa specimens: Large, 6–8 mm. Entirely red. Crista entire, with medial stigmal area and broad anteriorly pronged front plate (cf. fig.). Tarsus of front leg three times as long as high and a little longer than metatarsus. All tarsi with pseudopulvillar hairs. Palpal tibia with only the apical claw; palpal tarsus long, reaching tip of claw and slightly clubbed. Dorsal body hairs of two forms, a long type in which the hairlets are longer distally, giving the hair a clavate appearance, about 60 μ long, and a smaller type, which is stouter, pointed with a bare apex and smaller hairlets.

The above specimens are now in the South Australian Museum.

ALLOTHROMBIUM Berlese, 1903.

ALLOTHROMBIUM GUTTATUM Hirst, 1928.

Syn. *Allothrombium ornatum* Hirst, 1928.

In 1929 Hirst (¹⁰) gave a key separating these two species on slight differences in colour and structure of the longer body hairs. I have been able to examine his type material in the Australian Museum, which consists in the case of *A. guttatum* of three slides of the crista, first leg, and the palpi, with the remainder of the specimen in spirit. From the portion in spirit I have made a mount of a part of the cuticle. Of *A. ornatum* there are three slides of the first leg, palp, and the remainder of the specimen.

A careful examination of this material fails to show any good differences between the two species. At the best *A. ornatum* cannot be regarded as more than a slight variety of *A. guttatum*. The minor differences in the structure of the longer body hairs are of little value. In support of this view we find a specimen in spirit in the Australian Museum material, No. K. 58215, collected by Messrs. A. Musgrave and T. G. Campbell near Cutler's Pass, Williams River, New South Wales, 23/30/26, which was referred to by Hirst (¹⁰, p. 172) as *A. ornatum*. The actual specimen, however is labelled as *A. guttatum*. I have mounted a portion of the cuticle of this specimen, and find that it agrees with *A. guttatum*.

ALLOTHROMBIUM ANTIPODIANUM Hirst, 1926.

Syn. *Allothrombium antipodianum* var. *olorinum* Hirst, 1926.

Allothrombium parvulum Hirst, 1929.

The type of *A. antipodianum* v. *olorinum*, and also a nymph labelled "*A. antipodianum* var. ?" by Hirst, are in the South Australian Museum. They are

both from the Swan River district of West Australia and marked as found "with ants". From the original descriptions I can find no valid differences between these and *A. parvulum* Hirst. Although I have not seen the type of the last species I have specimens from Pinjarra, West Australia, collected on October 1, 1931 (D.C.S.), which I had provisionally determined as *A. parvulum*, but which equally well agree with *A. antipodianum*.

It is possible that Hirst's *A. terraereginae* may also be synonymous but I have no material available.

ALLOTHROMBIUM WYANDRAE Hirst, 1928.

The first leg and palp of the type of this species were found amongst the preparations in Professor Johnston's possession. They are now in the collection of the South Australian Museum.

To this species I refer specimens collected by Dr. R. J. Tillyard on Mount Kosciusko, F.C.T., in December, 1929.

ALLOTHROMBIUM DELICATULUM sp. nov.

Description: Length 1.0 mm., elongate oval in shape. Colour reddish. Eyes two on each side, pedunculate. Crista of typical form (cf. fig.). Front tarsus a little more than twice as long as high and rather longer than metatarsus. Palpal fibia with apical claw, palpal tarsus slightly clubbed, hardly reaching tip of claw. Body hairs of one type resembling those figured by Berlese for *A. meridionale*.

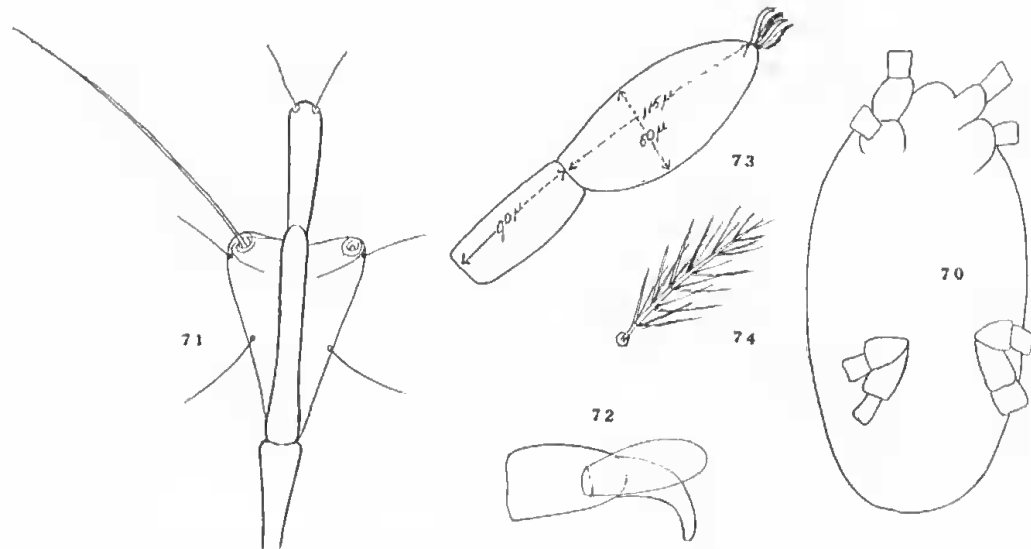


Fig. 70-74. *Allothrombium delicatulum* n.sp.: 70, outline of animal; 71, crista; 72, palp; 73, front tarsus and metatarsus; 74, dorsal seta.

Syntypes: Two specimens collected by Mr. D. C. Swan at Bridgewater, South Australia, June 6, 1932; in the South Australian Museum.

Remarks: Very close to *meridionale* Berlese, but differs in size and in the dimensions of the front tarsi.

KEY TO THE AUSTRALIAN SPECIES OF ALLOTHROMBIUM.

1. Very small species, 1.0 mm., sparsely haired. Hairs uniform and with few long secondary hairs *A. delicatulum* sp. nov.
Much larger species 2.
2. Dorsum with a distinct pattern of red and white. Some of the body hairs very much elongated *A. gullatum* Hirst, syn. *A. ornatum* Hirst.
Colour entirely red 3.
3. Body hairs of two distinct types 4.
Body hairs uniform, short, plumose. Front tarsus twice as long as high.
A. wyandrae Hirst.
4. Longer body hairs more clavate apically, axial thread thicker. Shorter hairs more tapering apically *A. antipodianum* Hirst, syn. *A. parvulum* Hirst.
Longer body hairs less clavate, the hairlets longer near the base, stalk apparently shorter. Short hairs not tapering apically *A. terraereginae* Hirst.

KEY TO THE AUSTRALIAN GENERA OF ADULT TROMBIDIDAE.

1. Body with lateral prominences *Chyzeria* Canestrini, 1897.
Body without these 2.
2. Without a crista *Trombella* Berlese, 1887.
With a crista; sensillary hairs not clavate 3.
3. Crista with two sensillary areas and four sensory hairs 4.
Crista with only one sensillary area and two sensory hairs 5.
4. The sensillary areas separated, one at each end of crista. One eye on each side and placed in front of anterior end of crista.
Myrmicoltrombium gen. nov.
The sensillary areas adjacent, behind one another. Two eyes on each side ⁽¹⁾.
Diplaltrombium Berlese, 1910.
5. Eyes one or none on each side *Trombicula* Berlese, 1905.
Eyes two or none on each side 6.
6. Eyes two on each side, pedunculate 9.
Eyes, if present, then sessile and two on each side 7.
7. With a distinct nasus *Neotrombium* Leonardi, 1901.
Without a nasus. Legs I and IV shorter than the body 8.

(1) In the genus *Rohaultia* Oudemans 1911, the posterior sensillary area is separated from the anterior, but placed in the middle of the crista and on a broad transverse plate. There are two eyes on each side.

8. Hairs feather-like and unmodified . . . *Microtrombidium* s.str. Haller.
Hairs of varying form with minute ciliations.
Microtrombidium, subgen. *Euemotrombidium* Berlese, 1910.
9. Tarsi with distinct pulvilli or a group of pulvilla-like hairs 10.
Tarsi without these. Crista with broader anterior plate with straight or sinuate anterior margin. Crista entire with median sensillary area.
Caenothrombidium Oudemans, 1928.
10. Tarsi with distinct and true pulvilli. Crista in three parts, the median sensillary area broader and more characteristic *Allothrombidium* Berlese, 1903.
Tarsi with 5-6 pulvilla-like hairs. Crista entire with medium sensillary area and much broader anterior plate with forwardly directed arms or prongs.
Austrothrombidium gen. nov.

LARVAL FORMS OF TROMBIDIIDAE.

TROMBICULA Berlese.

TROMBICULA HIRSTI Sambon, 1927.

Of this species, the "fi-tree itch mite" of Queensland and South Australia, there were two slides each of two specimens in the Hirst material left in Adelaide. The specimens were collected at Robe, South Australia, by Mr. Stanley Hirst in

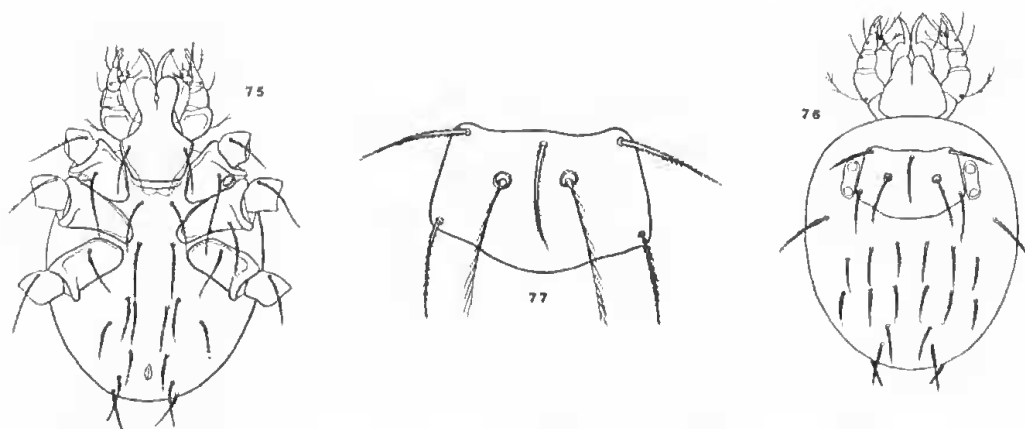


Fig. 75-77. *Trombicula hirsti* Sambon: 75, ventral view; 76, dorsal view; 77, dorsal shield (all after Sambon).

1928. One slide is now in the South Australian Museum. Another slide containing a number of specimens has also been presented to the Museum by Mr. D. C. Swan. These were collected in the same locality in 1934. To facilitate determination of these mites Sambon's figures are reproduced.

TROMBICULA NOVAE-HOLLANDIAE Hirst, 1929.

There were many slides of this species amongst the Hirst material, all taken from the ears of *Rattus greyi* from D'Estree Bay, Kangaroo Island, South Australia. These should probably all be regarded as syntypes. Some of them have been presented to the South Australian Museum by Professor Harvey Johnston.

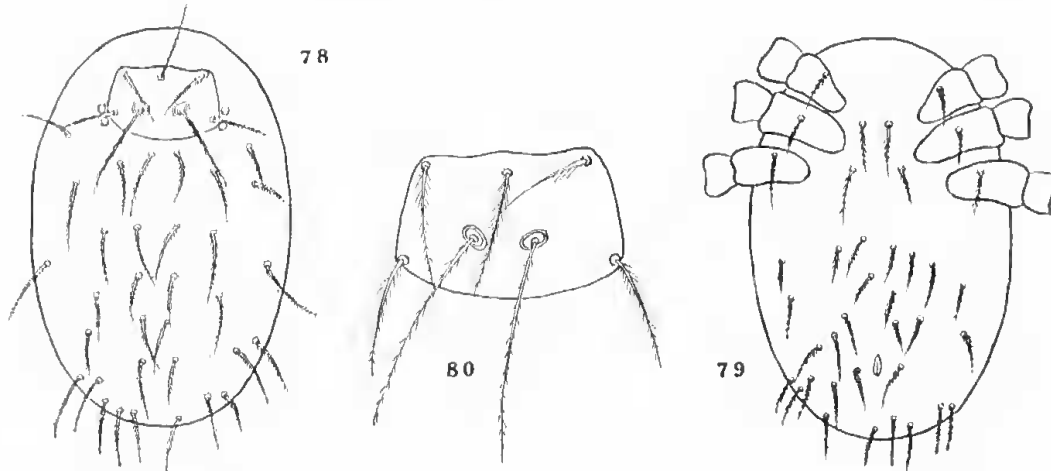


Fig. 78-80. *Trombicula novae-hollandiae* Hirst: 78, dorsal view; 79, ventral view; 80, dorsal shield (all after Hirst).

Other specimens in the South Australian Museum were obtained from the ears of *Potarus tridactylus*, collected at Bothwell, Tasmania, by Mr. H. H. Finlayson in August, 1931. Hirst's figures are reproduced.

SCHONGASTIA Oudemans, 1910.

SCHONGASTIA ANTIPODIANUM Hirst, 1929.

This species was obtained by Hirst from the ears of *Rattus greyi* from D'Estree Bay, Kangaroo Island, South Australia. Many of his syntypes were

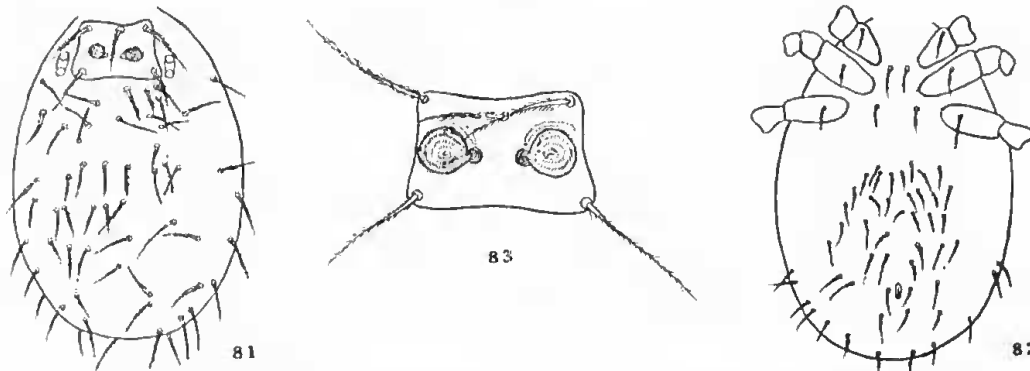


Fig. 81-83. *Schongastia antipodianum* Hirst: 81, dorsal view; 82, ventral view; 83, dorsal shield (after Hirst).

amongst the material left in Adelaide, and some have been presented to the South Australian Museum. For comparison Hirst's figures are reproduced.

SCHONGASTIA COORONGENSE Hirst, 1929.

Hirst described this species from specimens taken from the ears of a rodent at Robe, South Australia, in December, 1926. His syntypes were amongst the material left in Adelaide, and some have been presented to the South Australian Museum.

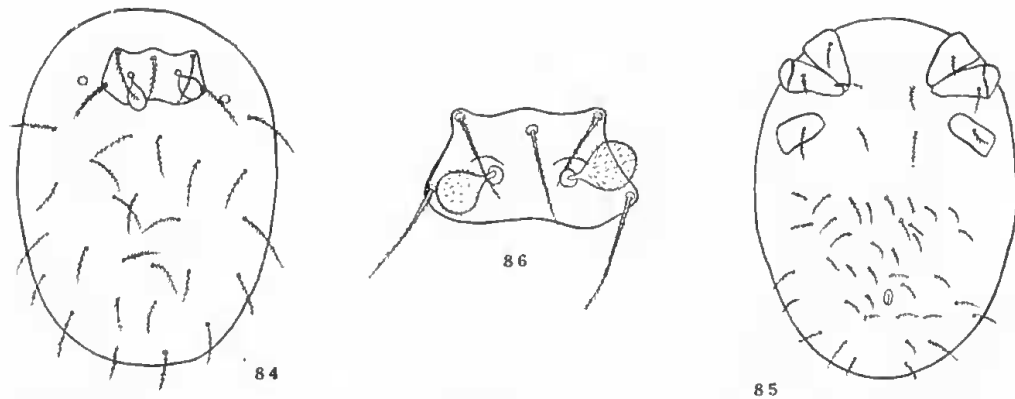


Fig. 84-86. *Schongastia coorongense* Hirst: 84, dorsal view; 85, ventral view; 86, dorsal shield (after Hirst).

SCHONGASTIA DASYCERCI Hirst, 1929.

From the ears of *Dasycercus cristicauda*, from Ooldea, South Australia. The syntypes were amongst the material left in Adelaide, and some of the slides are now in the collection of the South Australian Museum.

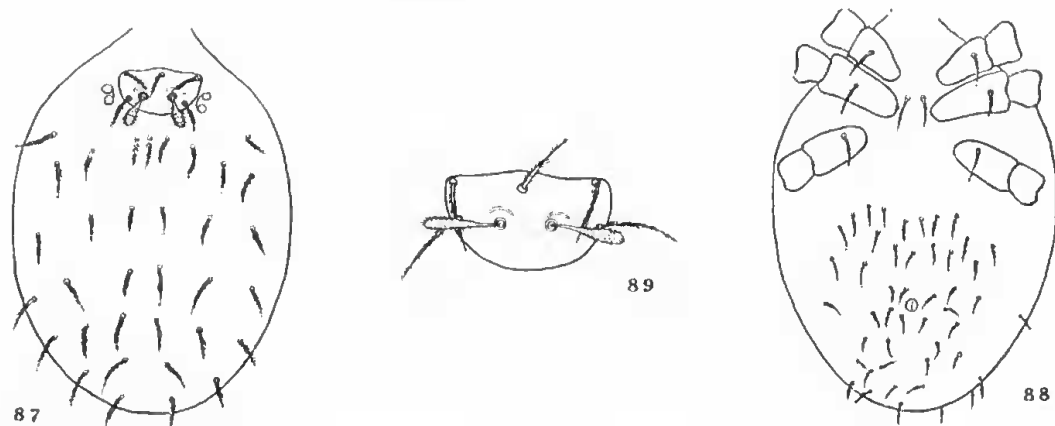


Fig. 87-89. *Schongastia dasycerci* Hirst: 87, dorsal view; 88, ventral view; 89, dorsal shield (after Hirst).

SCHONGASTIA WESTRALIENSE sp. nov.

Description: Sensory hairs of dorsal scutum elongate, clavate, with numerous fine ciliae, resembling those of *S. dasycerei* Hirst. Anterior lateral hairs of scutum shorter than the median anterior hair. Posterior lateral hairs of scutum very long, about three-fourths the width of scutum. Posterior margin of scutum sinuate and medially emarginate; anterior edge lightly concave. Eyes paired but indistinct. Dorsal body setae about 50, short, slightly curved and feathered,

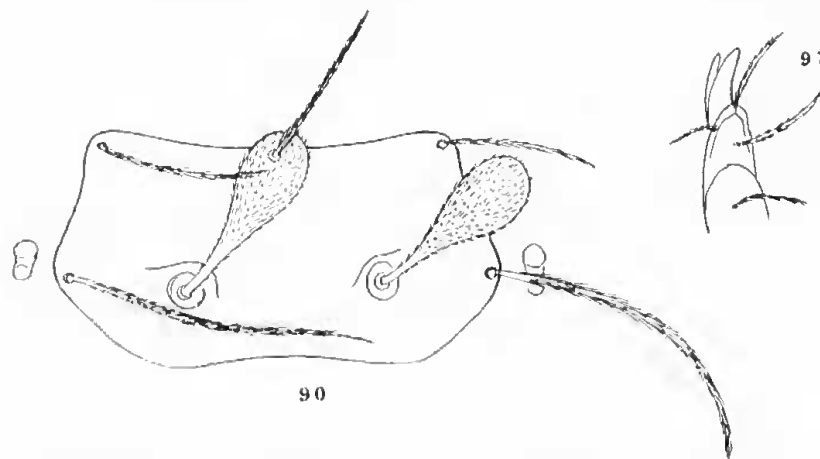


Fig. 90-91. *Schongastia westraliense* n.sp.: 90, dorsal shield and eyes; 91, tip of palp.

about $8\ \mu$ long. Hairs of palpi as in *Trombicula*, but those of the palpal tarsus are long and overreach the claw. Palpal claw with two accessory claws. Hairs of legs long and strongly ciliated, but there is no unfeathered hair as is described for *S. dasycerei* Hirst. Length of body $525\ \mu$; first leg (excluding coxae) $210\ \mu$, second $210\ \mu$; third $250\ \mu$; dorsal scutum in middle $55\ \mu$ long, width $105\ \mu$; sensory hairs of scutum $38\ \mu$, anterior medial hair $50\ \mu$, posterior lateral hair $76\ \mu$.

Locality: Ears of a cat from Greenbushes, West Australia, August, 1931.

Syntypes: In the South Australian Museum.

SCHONGASTIA PETROGALE sp. nov.

Description: Dorsal scutum trapezoidal, the anterior margin straight and shorter than the posterior margin, which is slightly sinuate medially. Sensory hairs globular with very fine ciliae. Other hairs of scutum comparatively short and strongly feathered, little longer than the sensory hairs; the posterior lateral hairs are a little behind the sensory hairs. Eyes paired and equal. Dorsal body hairs very numerous, pointed, slightly curved, and with long secondary hairs (cf.

fig.). Palpi as figured, the longest feathered hair of tarsus overreaching tip of claw, which claw is trifurcate. Legs without any unfeathered hairs.

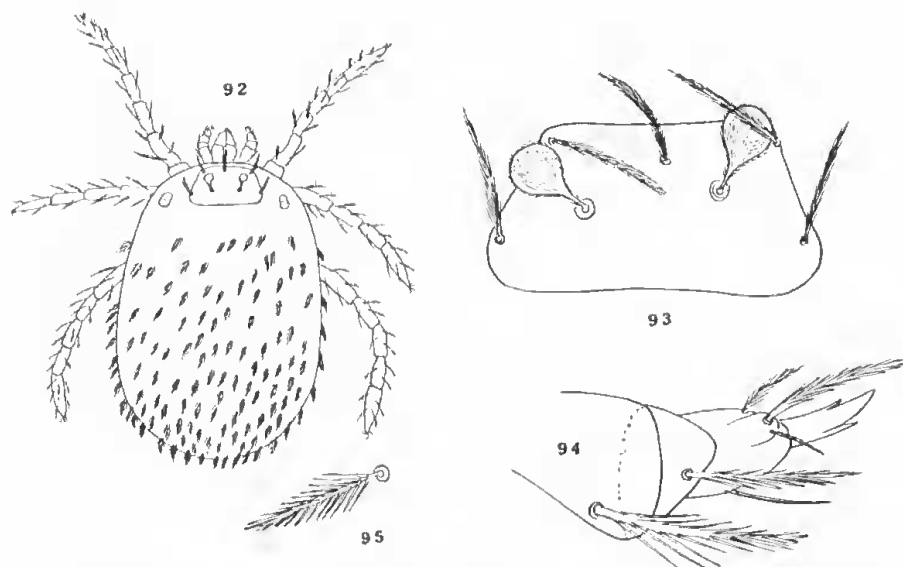


Fig. 92-95. *Schongastia petrogale* n.sp.: 92, dorsal view of animal; 93, dorsal shield; 94, palp; 95, dorsal hair.

Length 420 μ , breadth 270 μ , slightly constricted just behind the legs; front legs (excluding coxae) 220 μ , middle legs 180 μ , hind legs 230 μ . Length of scutum 38 μ , width posteriorly 92 μ , anteriorly 74 μ ; length of sensory hairs of scutum 20 μ , of posterior hairs 37 μ , dorsal body hairs 35 μ .

Locality: Musgrave Ranges, South Australia, July, 1933, on scrotum of a wallaby, collected by Dr. C. J. Hackett.

Syntypes: In the South Australian Museum.

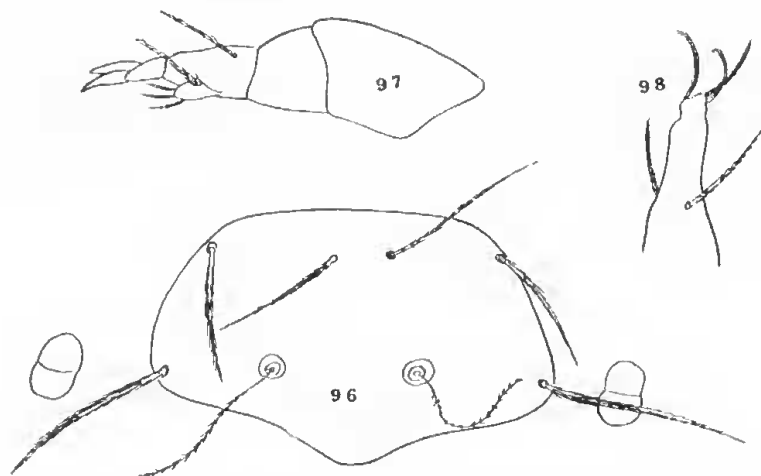


Fig. 96-98. *Leuvenhockia australicuse* Hirst: 96, dorsal shield and eyes; 97, palp; 98 tip of tarsus.

Remarks: This species differs from all hitherto described forms in the shape of the dorsal scutum and in the number and structure of the dorsal body setae.

LEUWENTHOEKIA Oudemans, 1911.

LEUWENTHOEKIA AUSTRALIENSE Hirst, 1929.

I have not been able to locate the types of this species, but in the South Australian Museum are specimens from the ears of a cat, collected at Glen Osmond, South Australia, by Mr. D. C. Swan in November, 1931.

KEY TO THE LARVAL TROMBIDIDAE KNOWN FROM AUSTRALIA.

1. With only one antero-medial hair on scutum 2.
 With two antero-medial hairs on scutum Gen. *Leuwenthoekia* Ouds.
australiense Hirst.
2. Sensory hairs of scutum long and fine with secondary hairlets 3.
 Gen. *Trombicula* Berl.
 Sensory hairs of scutum clavate or globose 4.
 Gen. *Schongastia* Ouds.
3. Dorsal scutum about one-third wider than long. The sensory and posterior hairs approximately in the middle line of scutum. Dorsal body setae 2-6-6-1-2. Posterior angles of scutum truncate. Smaller species.
T. hirsti Sambon.
 Dorsal scutum at least twice as wide as long. The sensory and posterior hairs of scutum in a line well behind the middle. Dorsal body setae 2-6-6-6-6-4. Posterior angles of scutum rounded. Larger species.
T. novae-hollandiae Hirst.
4. Sensory hairs of scutum clavate not globose 5.
 Sensory hairs of scutum globose not clavate 6.
5. Front margin of scutum produced slightly medially; lateral and posterior margins evenly rounded *S. dasycecei* Hirst.
 Front margin of scutum slightly concave, lateral margins divergent posteriorly, posterior margin slightly sinuate medially. *S. westraliense* sp. nov.
6. Body hairs very numerous, comparatively short, and with long secondary hairs. Ordinary hairs of scutum comparatively short. Posterior edge of scutum longer than anterior and straight or slightly sinuate.
S. petrogale sp. nov.
 Body hairs not so numerous, longer, and with only short secondary hairs 7.
7. Dorsal scutum widest behind the middle. Posterior edge of scutum slightly sinuate medially. Sensory and posterior scutal hairs on line of greatest width. Lateral edges of scutum produced outwardly on line of greatest width *S. coorongense* Hirst.
 Dorsal scutum widest on posterior edge, posterior hairs at postero-lateral corners and well behind the sensory hairs which are submedial. Lateral edges of scutum straight. *S. antipodiamum* Hirst.

FAMILY ERYTHRAEIDAE.

ERYTHRAEUS Latreille, 1806.

ERYTHRAEUS CELERIPES (Rainbow, 1906).

Syn. *Rhyncholophus celeripes* Rainbow, 1906.*Leptus imperator* Hirst, 1928.

This species was described and the entire animal figured by Rainbow in 1906 (14). The type material consisting of about a dozen specimens is in the Australian Museum. *Leptus imperator* was described by Hirst in 1928 without any figures. His type is in the collection of the South Australian Museum. I

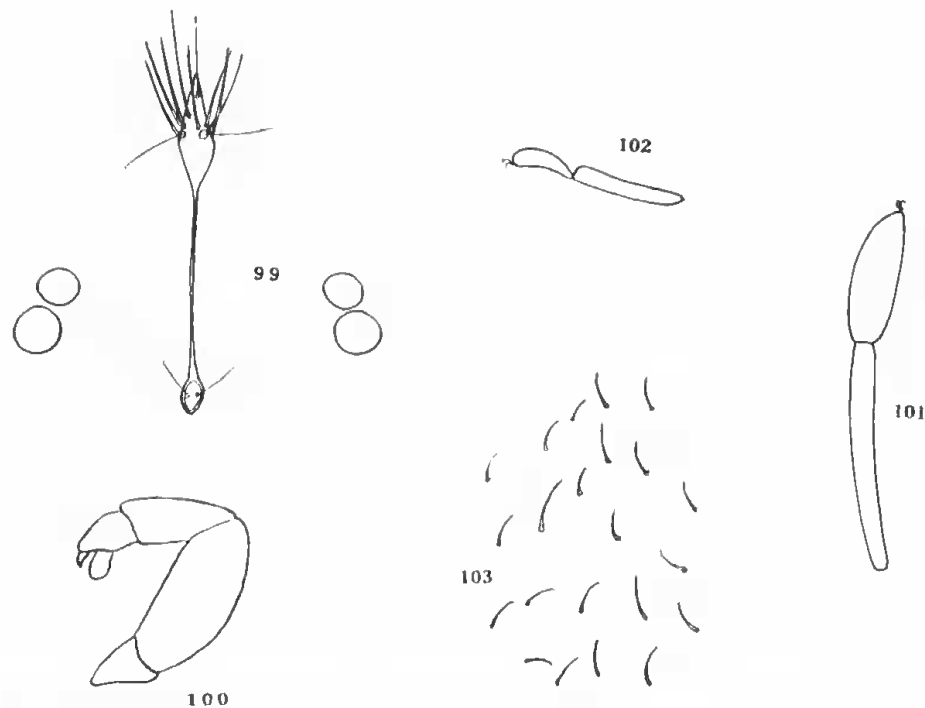


Fig. 99-103. *Erythraeus celeripes* (Rainbow): 99, crista and eyes; 100, palp; 101, front tarsus and metatarsus; 102, second tarsus and metatarsus; 103, dorsal setae.

have been able to compare this material, and without any doubt the two species must be regarded as synonymous. Both descriptions, however, are not satisfactory, and I have therefore drawn up the following fresh description from mounted specimens of Rainbow's material. The figures are also from the same specimens.

Redescription: Length to 3.8 mm. Crista distinct, linear, 1.480 μ long to tip of nasus, with two pairs of sensory hairs on enlarged areas at the extremities.

The anterior area of crista is produced into a conical nasus furnished with a number of long setae. The shield of the crista is indistinct. Eyes four, two on each side, sessile, slightly behind the middle of the crista, the anterior eye of each pair is slightly the smaller. Legs I and IV very much longer than the body, I 6.7 mm. long, II 3.8 mm., III 4.2 mm., IV 5.9 mm.; front tarsus 850 μ long by 270 μ high, metatarsus 1,500 μ , second tarsus 410 μ by 110 μ , tarsal scopulae fairly distinct except on front tarsi. Palpi as figured, with apical claw and short tarsus which is scarcely longer than wide. Dorsal body hairs short, curved, spiniform, 40 μ long, not ciliated; ventral hairs longer, reaching 120 μ . Long setae on nasus indistinctly ciliated.

Localities: In addition to the localities given by Rainbow and Hirst the writer has found this species under Eucalyptus bark at Armadale, West Australia, August 6, 1932, while Professor W. M. Wheeler has collected specimens in King's Park, Perth, West Australia, in September, 1931. In the Australian Museum are two specimens collected by Mr. A. Musgrave in the National Park, New South Wales, on October 2, 1933.

Remarks: In life this species is often of a dark shining metallic-green colour with a light dorsal stripe.

ERYTHRAEUS REGINAE (Hirst, 1928).

Syn. *Leptus reginae* Hirst, 1928.

Leptus antipodians Hirst, 1928.

The syntypes of *L. reginae* and the type of *L. antipodians* were amongst the Hirst material in Adelaide, and are now in the South Australian Museum. A critical study of this material fails to show any significant differences between the two species. They were both described in the same paper in which *L. reginae* has page priority.

The syntypes of *L. reginae* are from the Parklands, Adelaide, on December 2, 1927, but amongst Hirst's material were also specimens from Barrington, New South Wales, in June, 1927; Bourke, New South Wales, in August, 1927; and from Orange, Queensland, for which no date is given. The type of *L. antipodians* is from Tamunda, South Australia, on March 24, 1927. In addition the writer has four specimens collected by himself on Rattnest Island, West Australia, in January, 1931.

As both descriptions are inadequate and without figures, a redescription and figures drawn from the syntypes of *L. reginae* are given.

Redescription: Length to 2.9 mm. Crista long and linear, with two enlarged

areas each bearing a pair of sensory hairs, one area at each end of crista. Crista without a distinct sheath. The anterior area of crista is produced into an elongate nasus furnished with a number of long strongly ciliated setae; length of crista to

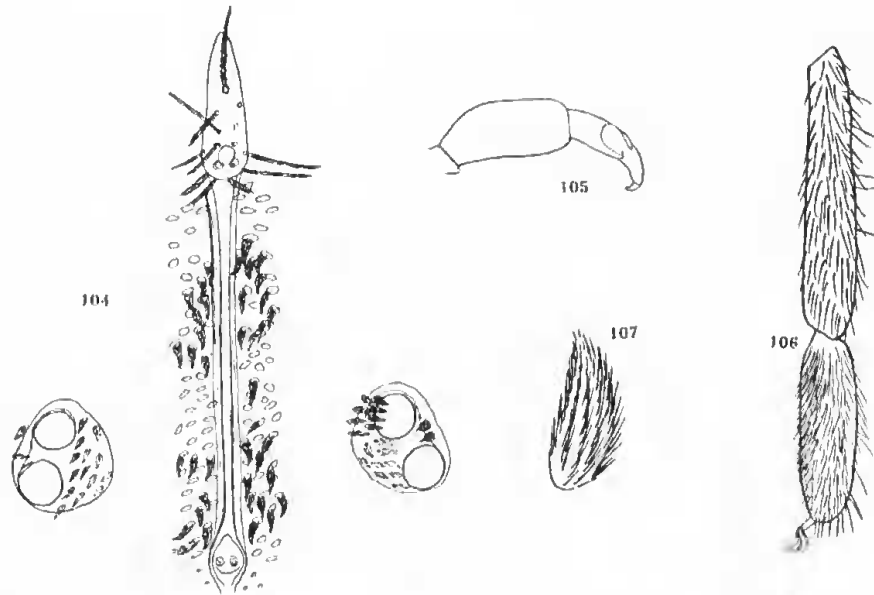


Fig. 104-107. *Erythraeus reginae* (Hirst): 104, crista and eyes; 105, palp; 106, front tarsus and metatarsus; 107, dorsal seta.

tip of nasus 1,200 μ . Eyes two on each side, sessile, on a distinct plate. Palpi normal, as figured. Legs I and IV longer than the body, I 4.3 mm. long, II 2.9 mm., III 3.3 mm., IV 5.4 mm.; front tarsus 540 μ long by 165 μ high, metatarsus 330 μ , tarsal scopulae fairly well developed. Dorsal hairs scale- or leaf-like, pointed, and broad with minute ciliations, 30-35 μ long.

ERYTHRAEUS PILOSUS (Hirst, 1928).

Syn. *Leptus pilosus* Hirst, 1928.

The type, from Dubbo, New South Wales, collected by Hirst on August 7, 1927, was found amongst the material left in Adelaide. It has now been presented to the South Australian Museum by Professor Harvey Johnston. A further specimen was found by myself under gum-tree bark in the grounds of the Waite Institute, Adelaide, South Australia, in September, 1933, and in the South Australian Museum are also three specimens collected at Belair, South Australia, in January, 1934 (R.V.S.).

As in the preceding species it is necessary to redescribe this form, and figures drawn from the type are given.

Redescription: Length 2.2 mm. Crista linear, 650 μ long, with enlarged stigmal areas at each end. The anterior area is bulbous and not produced into a nasus; it is furnished with a number of long pointed strongly ciliated setae. Eyes two on each side, sessile, on a distinct shield and placed fairly close to the

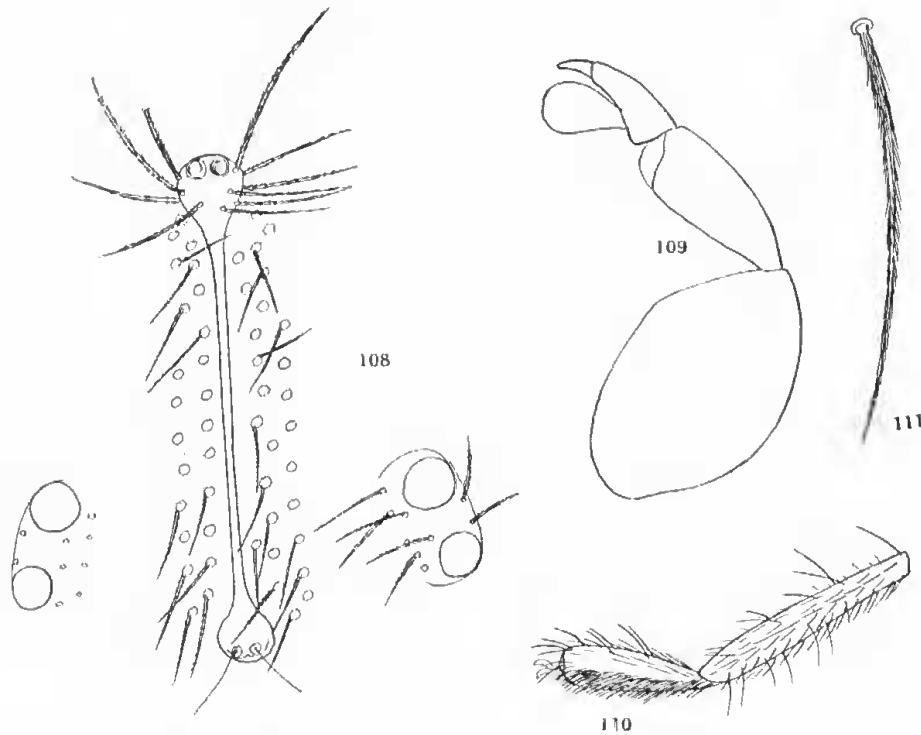


Fig. 108-111. *Erythraeus pilosus* (Hirst): 108, crista and eyes; 109, palp; 110, front tarsus and metatarsus; 111, dorsal seta.

crista but behind its middle. Palpi normal as figured. Legs I and IV longer than the body, I 3.35 mm. long, II 2.5 mm., III 2.5 mm., IV 4.2 mm., front tarsus 450 μ long by 120 μ high, metatarsus 665 μ . Clothing of long, pointed, strongly ciliated setae 200 μ long.

ERYTHRAEUS URUBRAE sp. nov.

Description: Length 2.6 mm. Colour dark, slightly reddish. Crista well chitinized, 750 μ long, with anterior and posterior sensory areas, the anterior of which is bulbous and not produced into a nasus, furnished with a number of long, finely ciliated, blunt setae. Eyes two on each side, slightly behind the middle of crista, sessile, ocular shield not distinct. Palpi normal, as figured, with fairly strong claw and long, clubbed tarsus reaching to or slightly beyond tip of claw. Legs I and IV longer than body, I 3.75 mm., II 2.4 mm., III 3.0 mm., IV 4.5 mm., front tarsus 550 μ long by 150 μ high, metatarsus 825 μ . Clothing

of numerous dark, strong setae, which are strongly ciliated and blunt apically, variable in length up to 200 μ , more numerous than in preceding species.

Syntypes: Two specimens in the South Australian Museum, collected by myself under Eucalyptus bark in the grounds of the Waite Institute, Urrbrae, South Australia, in September, 1933.

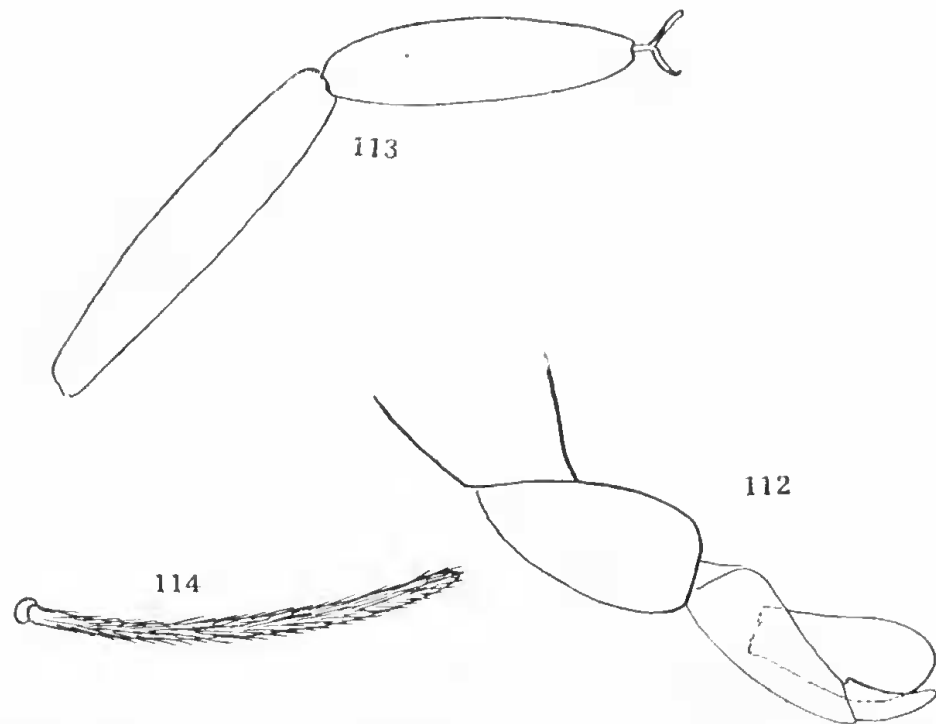


Fig. 112-114. *Erythraeus urbrae* n.sp.: 112, palp; 113, front tarsus and metatarsus; 114, dorsal seta.

Remarks: Closely related to the preceding but distinct in the nature of the clothing.

KEY TO THE AUSTRALIAN SPECIES OF ERYTHRAEUS.

1. Hairs of dorsum short and leaf- or scale-like, pointed, with short ciliations.
E. reginae (Hirst).
- Hairs on dorsum not as above 2.
2. Anterior end of crista with a long nasus. Dorsal hairs long and spiniform, pointed, and only indistinctly ciliated. Tarsus of palp short, not longer than wide *E. celeripes* (Rainbow).
- Anterior end of crista without nasus. Palpal tarsus long and clubbed . . . 3.
3. Dorsal hairs fine and tapering to a point, of more uniform size.
E. pilosus (Hirst).
- Dorsal hairs stouter and blunt, not tapering to a point, of variable length.
E. urbrae sp. nov.

LEPTUS Latreille, 1795.

This genus differs from *Belaustium* in the eyes being placed before the middle of the crista, the crista being without any shield, the absence of a nasus, and in the structure of the dorsal body hairs.

LEPTUS WARREGENSE (Hirst, 1928).

Syn. *Belaustium warregense* Hirst, 1928.

The syntypes of this species were found amongst the Hirst material in Adelaide, and are now in the South Australian Museum. The following redescription and figures are drawn from the syntypes:

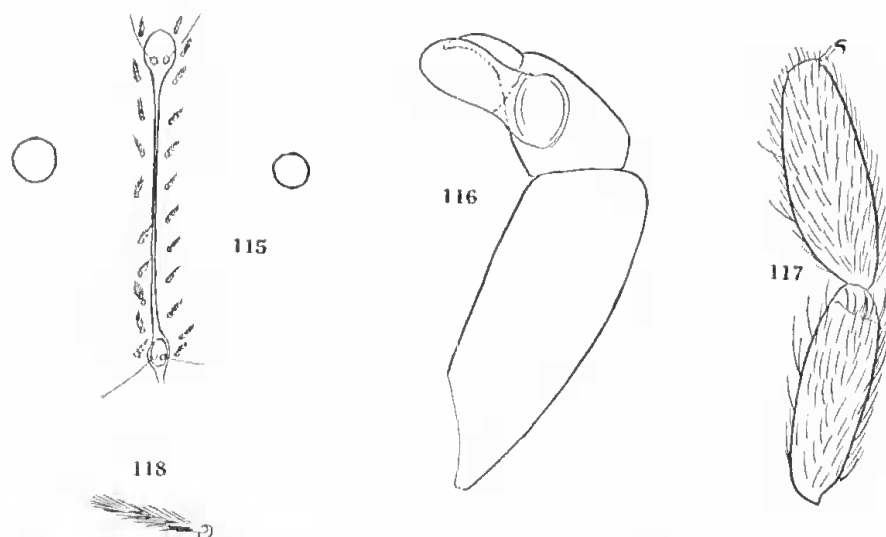


Fig. 115-118. *Leptus warregense* (Hirst): 115, crista and eyes; 116, palp; 117, front tarsus and metatarsus; 118, dorsal seta.

Redescription: Length 1.575 mm. Crista well developed, linear, 440 μ long, without shield, anterior and posterior sensillary areas each with the usual pair of sensory hairs. Eyes one on each side, placed slightly behind the anterior sensillary area. Palpi as figured, with small tibial claw and long, clubbed tarsus overreaching tip of claw. Legs not longer than body, I 1,660 μ , II 1,050 μ , III 1,225 μ , IV 1,450 μ ; front tarsus 300 μ long by 110 μ high, metatarsus 275 μ long, all tarsi without scopulae. Hairs on legs long, pointed, and strongly ciliated; on dorsum 35-40 μ long, strongly feathered, rather blunt, and not as bushy as in the following species.

LEPTUS ORNATUS sp. nov.

Description: Small, length 1.35 mm., width 0.9 mm. Colour in life reddish. Crista distinct and well developed, 420 μ long, with anterior and posterior sensillary areas each with the usual pair of sensory hairs, anterior area of crista

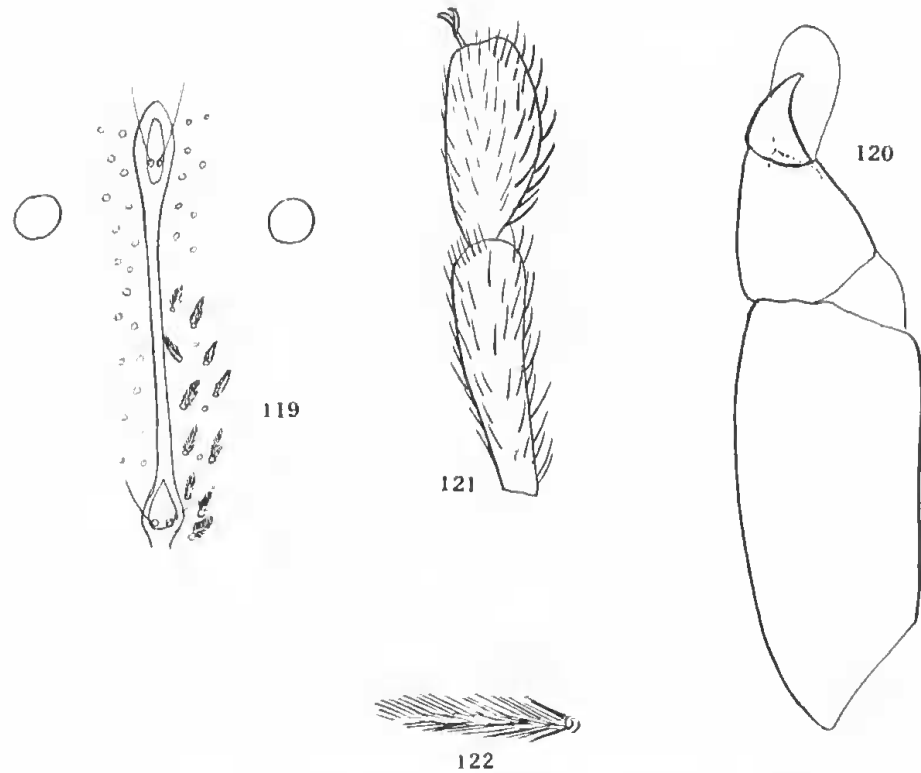


Fig. 119-122. *Leptus ornatus* n.sp.: 119, crista and eyes; 120, palp; 121, front tarsus and palp; 122, dorsal seta.

elliptical but without nasus. Eyes one on each side, placed just behind the anterior sensillary area. Palpi as figured, with strong but small tibial claw and long and stout tarsus scarcely clubbed but overreaching tip of claw. Legs I and IV slightly longer than the body, I 1,500 μ long, II 900 μ , III 1,200 μ , IV 1,650 μ , front tarsus short and elliptical, 260 μ long by 120 μ high, metatarsus rather longer, all tarsi without scopulae. Dorsal body hairs short and thick, 27 μ long, slightly curved, strongly feathered so as to appear bushy, mainly very dark, but there appears to be a medial patch where these hairs are light.

Type: From Rottnest Island, West Australia, January 31, 1931, collected by myself.

The above specimens are now in the South Australian Museum. This species can be distinguished from the preceding by the structure and dimensions of the front tarsus and the nature of the dorsal clothing.

BELAUSTIUM v. Heyden, 1826.

BELAUSTIUM NEWMANI sp. nov.

Description: Length 1.65 mm., width 1.3 mm. Colour in life reddish. Crista distinct and well developed on a narrow elongate shield, with anterior and posterior sensillary areas, the front area produced into a blunt nasal process, sensory hairs short, about 40μ long, crista 430μ long. Eyes one on each side,

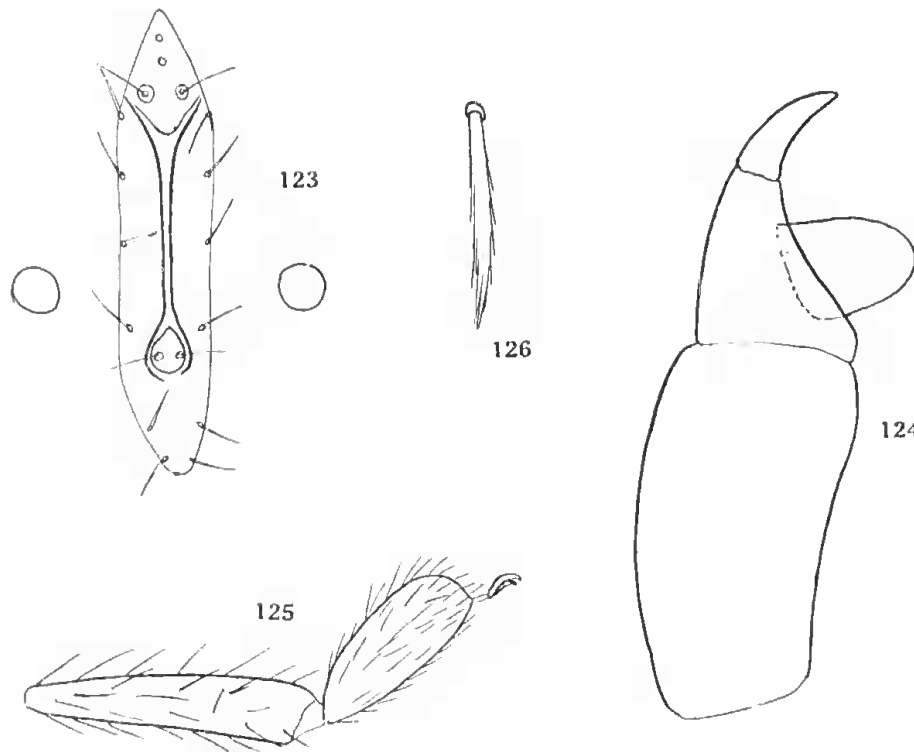


Fig. 123–126. *Belaustium newmani* n.sp.: 123 crista and eyes; 124, palp; 125, front tarsus and metatarsus; 126, dorsal seta.

sessile, placed slightly in front of the posterior and sensillary area. Palpi as figured, with strong, short tibial claw and short, stout tarsus. Legs I and IV scarcely longer than the body, I $1,700\mu$, II $1,200\mu$, III $1,200\mu$, IV $1,860\mu$, front tarsus 230μ long by 95μ high, metatarsus 360μ , all tarsi without scopulae. Dorsal setae ciliated as in *B. littorale* sp. nov., but stouter and straighter and apically blunt, sparser and more scattered.

Type and paratype: Perth, West Australia, collected by myself in 1931, now in the South Australian Museum. This species is named after Mr. L. J. Newman, Government Entomologist to West Australia as a slight mark of esteem.

BELAUSTIUM GLAUERTI sp. nov.

Description: Length 1.16 mm., width 1.75 mm. Crista distinct and well developed on an elongate shield, with anterior and posterior sensillary areas, each with the usual pair of sensory hairs. Length of crista 330 μ , of shield 430 μ , the anterior sensillary area produced in a blunt nasus, from the tip of which the

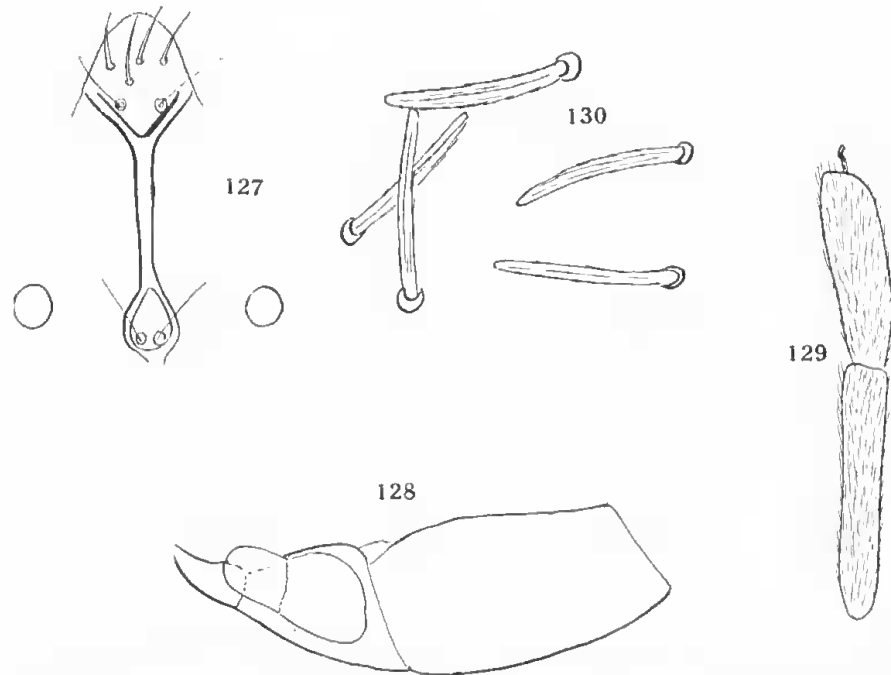


Fig. 127-130. *Belaustium glauerti* n.sp.: 127, crista and eyes; 128, palp; 129, front tarsus and metatarsus; 130, dorsal setae.

length of the crista is taken. Sensory hairs 115 μ long. Eyes one on each side, sessile, on a level with the posterior sensillary area. Palpi as figured. All legs longer than the body, I 2,820 μ , II 1,600 μ , III 1,760 μ , IV 2,820 μ , front tarsus 420 μ long by 110 μ high, metatarsus 490 μ long, all tarsi without scopulae. Dorsal hairs sparse and short, 30 μ long, not tapering, and more blunt than in previous species, indistinctly ciliated.

Type: A single specimen from Perth, West Australia, collected in 1932 by myself. The specimen is now in the South Australian Museum. It is named in honour of Mr. L. J. Glauert, Curator of the Perth Museum.

BELAUSTIUM LITTORALE sp. nov.

Description: Small, reddish. Length 2.4 mm., width 1.35 mm. Crista well developed, linear but thick, on a narrow elongate shield, with anterior and pos-

terior sensillary areas each with the usual pair of sensory hairs. The anterior area of crista is produced into a blunt nasus, and the length of the crista from its tip is $650\ \mu$. Palpi as figured, with small, strong tibial claw and short, stumpy tarsus. Eyes one on each side, placed slightly in front of posterior area of crista. Legs not longer than body, I $2,400\ \mu$, II $1,800\ \mu$, III $1,850\ \mu$, IV $2,500\ \mu$, front tarsus elliptical, $300\ \mu$ long by $150\ \mu$ high, metatarsus $420\ \mu$ long, all tarsi without scopulae. Dorsal body hairs long, $60\ \mu$, curved, slender and pointed, with cilia-tions on one side only, fairly numerous in good specimens.

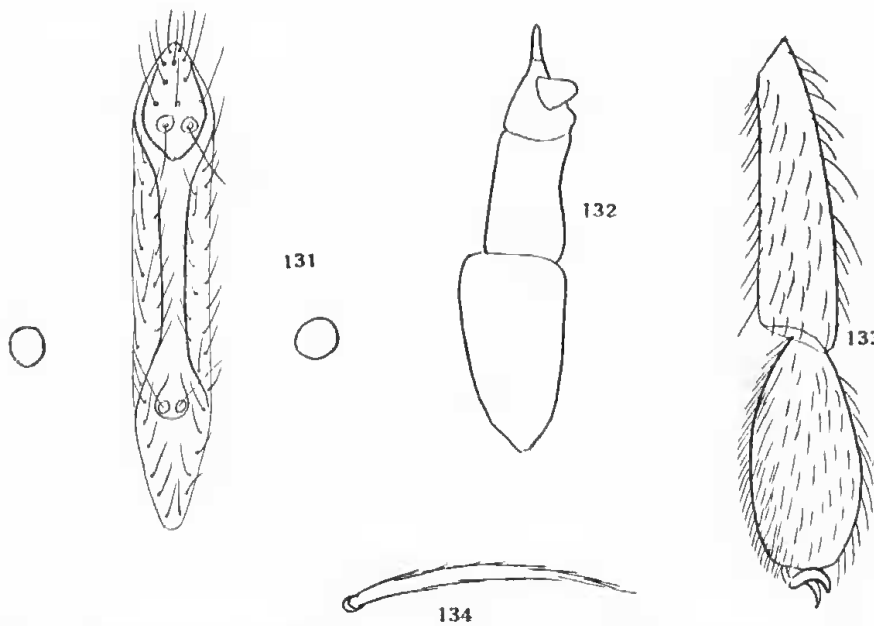


Fig. 131-134. *Belaustium littorale* n.sp.: 131, crista and eyes; 132, palp; 133, front tarsus and metatarsus; 134, dorsal seta.

Type and paratypes in the South Australian Museum, and collected under seaweed on shore at Point Perron, West Australia, April 6, 1931, by the writer.

Remarks: This species is very close to the European species *B. quisquiliarum* (Herman), as ascertained by comparison with an English specimen of that species. Herman's species has slightly shorter and perfectly plain setae on the dorsum.

BELAUSTIUM BREVUM sp. nov.

Description: Length $1.245\ \text{mm.}$, width $0.83\ \text{mm.}$ Crista distinct but shield rather obscure. Anterior and posterior sensillary areas present, anterior with a slight nasus. The sensory hairs of the crista are $115\ \mu$ long, the crista itself $320\ \mu$. Eyes one on each side, sessile, and placed behind the middle of the crista. Legs I and IV rather longer than the body, I $1,500\ \mu$, II $1,060\ \mu$, III $1,245\ \mu$,

IV 1,660 μ , front tarsus 260 μ long by 130 μ high, metatarsus 290 μ long, all tarsi without scopulae. Dorsal body hairs sparse, 75 μ long, fairly thick and bluntly pointed, slightly ciliated.

Type: A single specimen from Riverton, South Australia, September, 1933, collected by Mr. W. G. Johnston; in the South Australian Museum.

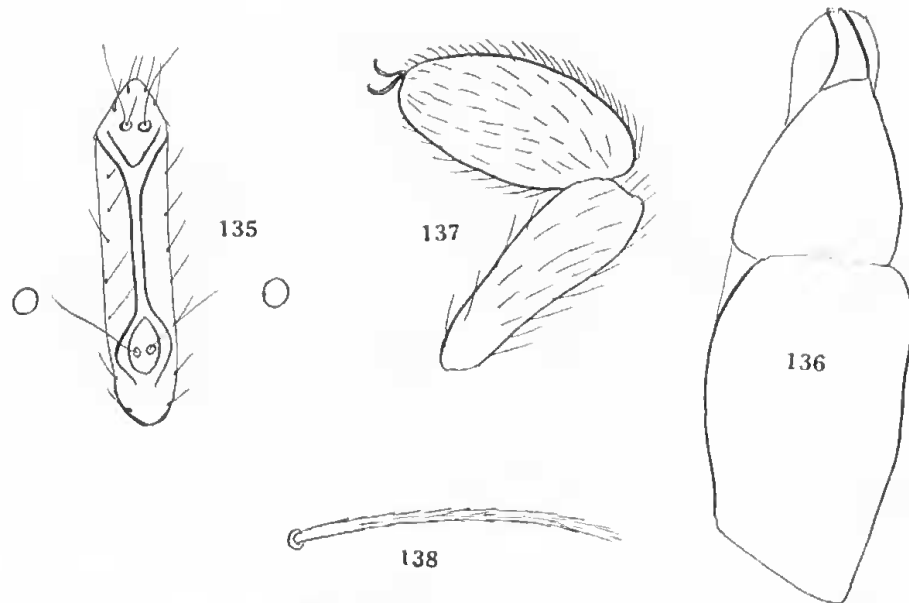


Fig. 135-138. *Belaustium brevum* n.sp.: 135, crista and eyes; 136, palp; 137, front tarsus and metatarsus; 138, dorsal seta.

BELAUSTIUM RIPICOLA sp. nov.

Description: Length 700 μ , width 350 μ . Colour in life bright red. Crista distinct with anterior and posterior areas, but with hardly any indication of a shield. Each area of the crista has the usual pair of sensory hairs, which are very finely ciliated. Length of crista 150 μ and of sensory hairs 45 μ . The front area of crista forms a small nasus furnished with a few long setae. Eyes one on each side in a line with the posterior sensillary area. There is a very distinct suture behind the cephalothorax. Palpi long and straight, as figured. Legs I 610 μ long, II 400 μ , III 435 μ , IV 570 μ , front tarsus elliptical, 110 μ long by 43 μ high, metatarsus 90 μ long. Clothing of moderately numerous pointed, curved setae, 20 μ in length, and under a high power slightly ciliated.

Locality: Amongst herbage on banks of Hindmarsh River, Victor Harbour, South Australia, in January, 1934 (H.W.).

Syntypes: In the South Australian Museum.

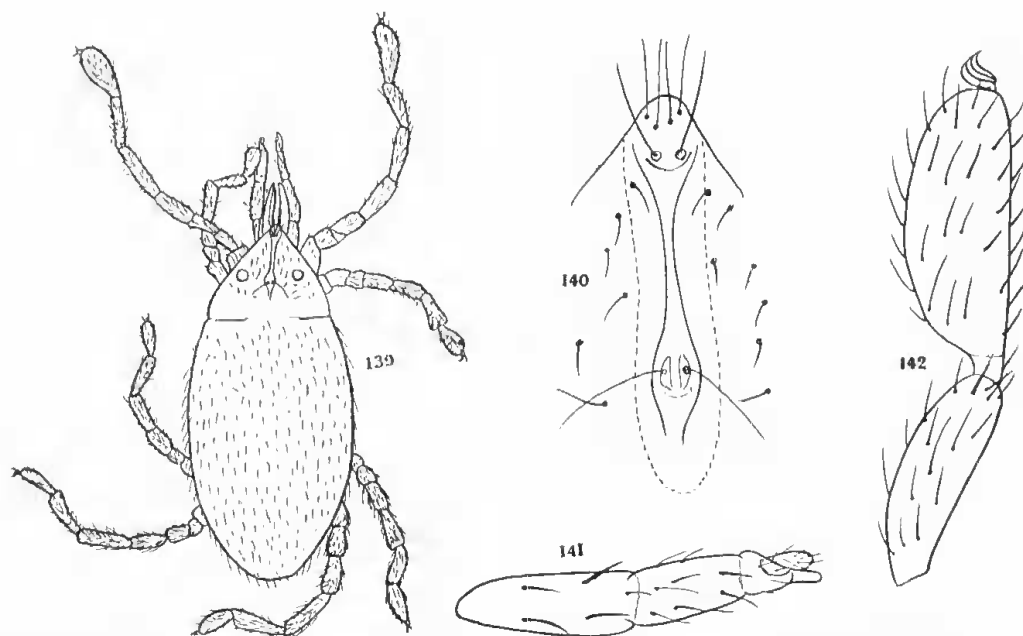


Fig. 139-142. *Belaustium ripicola* n.sp.: 139, dorsal entire view; 140, crista; 141, palp; 142, front tarsus and metatarsus.

BELAUSTIUM INSULARUM sp. nov.

Description: Length 810 μ . Colour in life reddish. Crista well developed but shield indistinct, with anterior and posterior sensillary areas each with the

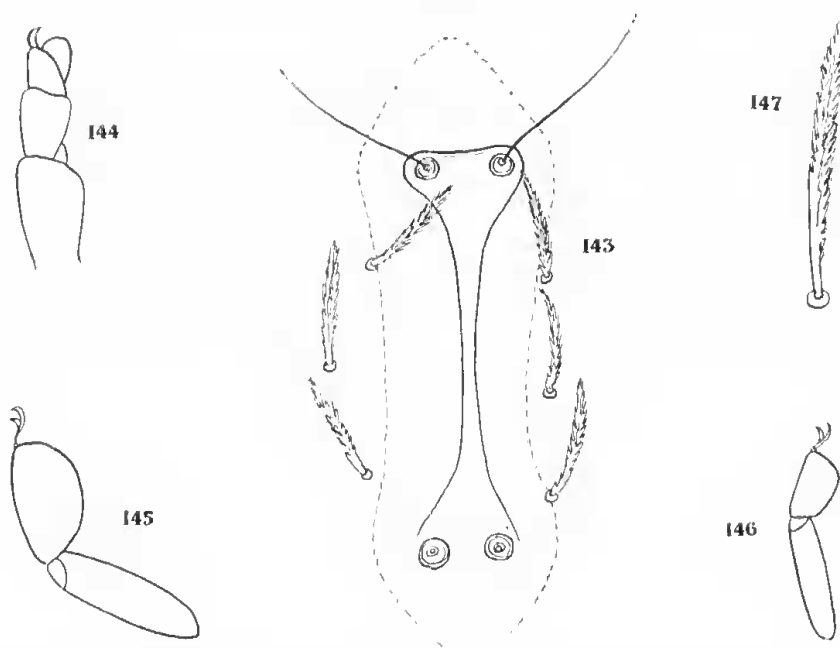


Fig. 143-147. *Belaustium insularum* n.sp.: 143, crista; 144, palp; 145, front tarsus and metatarsus; 146, second tarsus and metatarsus; 147, dorsal seta.

usual pair of sensory setae. Length of crista 380 μ , between sensillae 130 μ . Legs I 800 μ long, II 725 μ , III 750 μ , IV 1,010 μ , front tarsus elliptical, 130 μ long by 82 μ high, metatarsus 180 μ long. Dorsal setae fairly numerous, stout, a little wider at some distance from base, strongly ciliated, and 35–40 μ long.

Type: A single specimen collected on Rottnest Island, West Australia, January 31, 1931 (H.W.).

Remarks: This species is very closely related to *B. brevum* sp. nov., but differs in the structure of the dorsal setae and the proportions of the front tarsi.

KEY TO THE AUSTRALIAN SPECIES OF BELAUSTIUM.

1. Front tarsus elongate, almost parallel-sided, nearly 4 times as long as high, rather more than 4/5 the length of metatarsus. Dorsal hairs fairly long, indistinctly ciliated, blunt ended. Legs I and IV more than twice as long as body *B. glauerti* sp. nov.
 Front tarsus short and elliptical 2.
2. Front tarsus at least 2½ times as long as high 3.
 Front tarsus not more than twice as long as high 4.
3. Front tarsus 2½ times as long as high, metatarsus more than twice as long again. Dorsal hairs stout, tapering, indistinctly ciliated, almost straight and sparse. Legs I and IV only slightly longer than body. *B. newmani* sp. nov.
 Front tarsus slightly more than 2½ times as long as high, metatarsus shorter than tarsus. Clothing of moderately numerous pointed setae, 20 μ long, and indistinctly ciliated. Legs I and IV shorter than body *B. ripicola* sp. nov.
4. Front metatarsus only very slightly longer than tarsus. Body hairs stout, not tapering, but parallel-sided, blunt at apex and slightly ciliated. Small species 1.25 mm. *B. brevum* sp. nov.
 Front metatarsus quite half as long again as the tarsus 5.
5. Body hairs slender, curved, and pointed, only indistinctly ciliated. Larger species up to 2.5 mm. *B. littorale* sp. nov.
 Body hairs stout, strongly ciliated, and broadest at some distance from base, small species 0.8 mm. *B. insularum* sp. nov.

SPHAEROLOPHUS Berlese, 1910.

This genus is very close to *Belaustum* v. Heyden, 1826, from which it differs chiefly in the almost spherical and large tarsus of the palp. The crista is linear on a narrow shield, and has the usual two pairs of swollen areas at the extremities, each with two sensory hairs. The eyes are one on each side, placed behind the middle of the crista. The dorsal hairs are somewhat spiniform and only indistinctly ciliated.

No species has previously been recorded from Australia.

SPHAEROLOPHUS WESTRALIENSE sp. nov.

Description: Length 1.425 mm., width 0.83 mm. Colour in life red. Crista well developed on a narrow shield with anterior and posterior sensillary areas, without nasus. Length of crista 330 μ , of sensory hairs 135 μ . Eyes one on each

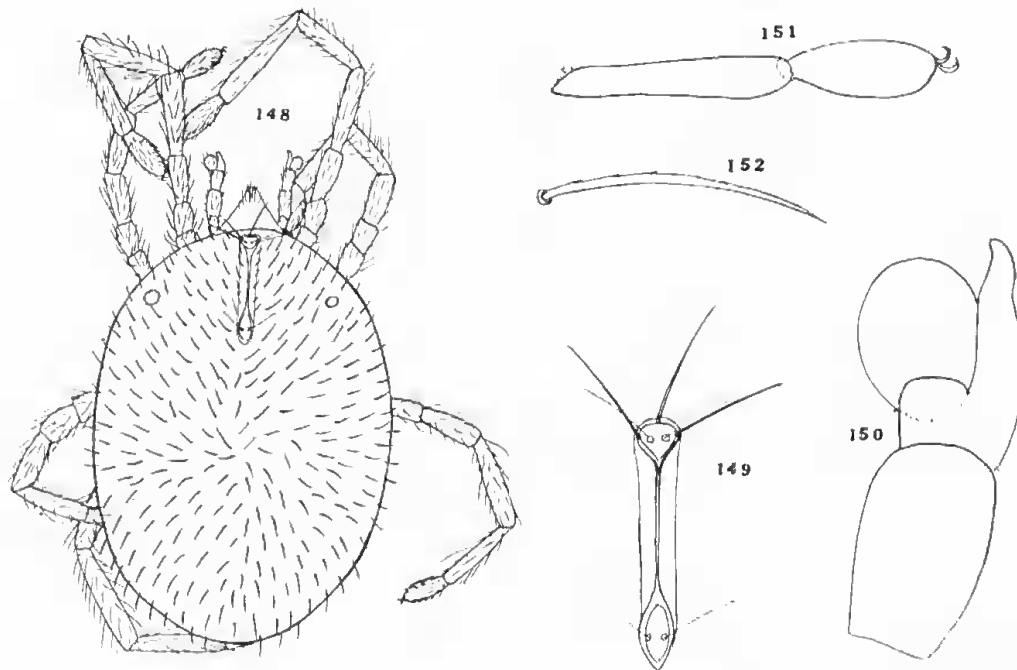


Fig. 148-152. *Sphaerolophus westraliense* n.sp.: 148, dorsal entire view; 149, crista; 150, palp; 151, front tarsus and metatarsus; 152, dorsal seta.

side behind middle of crista and at a considerable distance from it. Legs longer than body in first and fourth pairs, I 1,375 μ long, II 1,000 μ , III 1,080 μ , IV 1,660 μ , front tarsus 180 μ long by 75 μ high, metatarsus 300 μ long. All tarsi with indistinct scopulae. Palpi as figured. Body hairs long, finely pointed, slightly curved, and indistinctly ciliated, variable in length to 110 μ , fairly numerous.

Type and *paratype* from Bridgetown, West Australia, December 3, 1930, collected by the writer, and now in the South Australian Museum.

MICROSMARIS Hirst, 1926.

This genus was erected in 1926 by Hirst, when he described *Microsmaris mirandus* (⁶) from Christchurch, New Zealand. In 1928 (⁸) he added a second species, *M. goannae*, from Adelaide, South Australia, but unfortunately without figures and with a very poor and inadequate description. The genotype was, however, well described and figured.

The syntypes of *M. goanna* were found amongst the Hirst material in Professor Harvey Johnston's possession, and have now been placed in the South Australian Museum. Amongst the material collected by the writer while in West Australia, and now in the South Australian Museum, are a number of specimens which belong to this genus. Four of these agree with Hirst's description of *M. mirandus*, while the remaining two are a new species, to which the name *Microsmaris hirsti* is given.

A study of this material enables us to more definitely define the characters of the genus and also to redescribe *M. goanna*.

REDEFINITION OF GENUS MICROSMARIS.

Of comparatively small size. Mouth-parts styliform and but little retractile. Integument only lightly chitinized, devoid of ornamentation, but clothed with small simple spine-like setae. Crista obsolete, but two pairs of sensory hairs present, widely separated. One eye on each side behind the middle of where the crista would be. Legs generally not much longer than the body, unmodified, with simple hairs, tarsi with only indistinct scopulae. Dorsum with two pairs of large sensory pits edged with scale-like setae; one pair of pits situated medially and sublaterally, the other pair closer together and subapical.

MICROSMARIS MIRANDUS Hirst, 1926.

Four specimens collected by the writer at Mullewa, West Australia, in September, 1931, and now in the collections of the South Australian Museum, agree in detail with this species.

MICROSMARIS GOANNAE Hirst, 1928.

This species was described from specimens collected by Miss Joan Cleland and Mr. S. Hirst under Eucalyptus bark in a garden at Adelaide. It is named after Miss Cleland, and the specific name has no relation to the Australian species of *Taraxus*. The syntypes were amongst the Hirst material in Adelaide, and are now in the South Australian Museum. In the same material was also a single specimen collected by Hirst at Belair, South Australia, in January, 1928. Numerous examples were also taken from under Eucalypt bark on Mount Osmond, South Australia, February 3, 1934, by the writer.

The following redescription is drawn from the syntypes: Length 1.43 mm. Crista obsolete, but two pairs of sensory hairs present, 152 μ apart, the hairs 70-80 μ long. Eyes one on each side behind the middle of where the crista would

be. Palpi as figured. Legs short, I 1,580 μ long, II 1,030 μ , III 1,180 μ , IV 1,330 μ , front tarsus 170 μ long by 75 μ high, metatarsus 300 μ long. Clothing of numerous short, curved, spine-like setae, 20 μ long and interspersed, especially

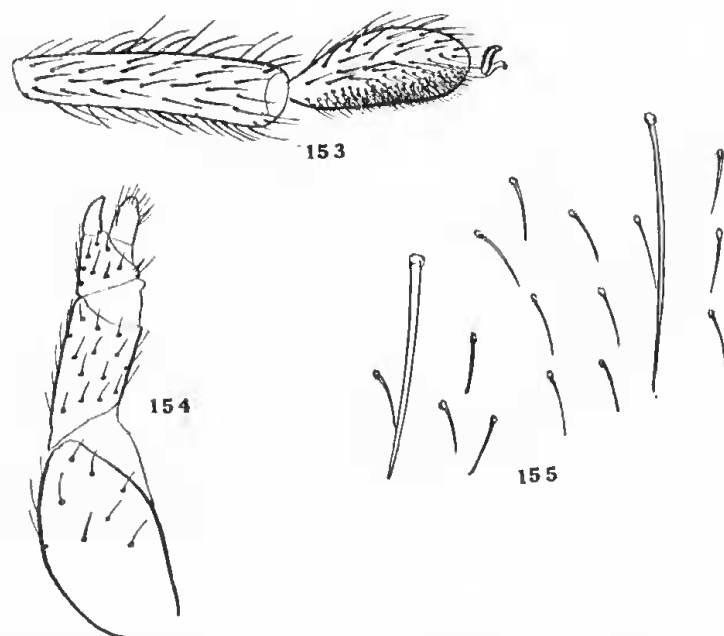


Fig. 153-155. *Microsmaris goannae* Hirst: 153, front tarsus and metatarsus; 154, palp; 155, posterior dorsal setae.

posteriorly, with much longer setae, which reach 70 μ in length. Dorsum with the usual two pairs of sensory pits.

The essential differences of this species from the other two are give in the key.

MICROSMARIS HIRSTI sp. nov.

Description: Length 1.0 mm. Colour in life red. Crista obsolete, but two pairs of sensory hairs present, 112 μ apart and the hairs 70 μ long. Eyes one on each side, behind the middle of where the crista would be. Legs not longer than body, I 1,000 μ long, II and III 830 μ , IV 920 μ , front tarsus 135 μ long by 65 μ high, metatarsus 164 μ long. Palpi as figured. Clothing of numerous short, curved, spine-like setae, 30 μ long, posteriorly the dorsum has some slightly longer but similar setae which reach 40 μ in length. Dorsum with the usual two pairs of sensory pits 35 μ in diameter.

Type: Freshwater Bay, Swan River, Perth, West Australia, November 15, 1930 (H.W.).

Paratype: King's Park, Perth, West Australia, September 5, 1931 (H.W.).

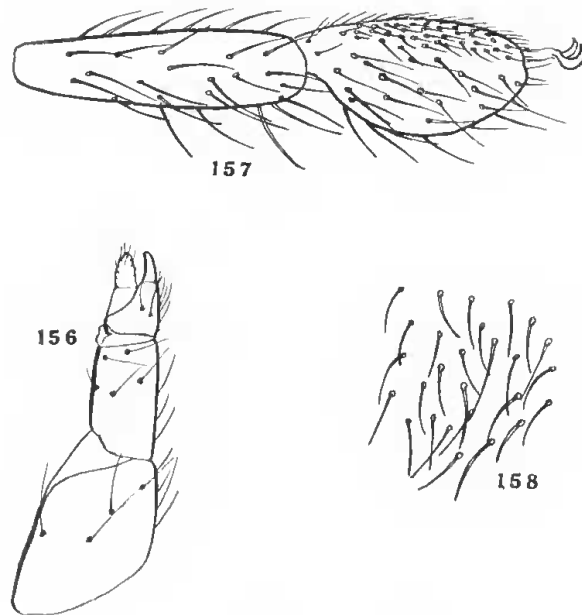


Fig. 156-158. *Microsmaris hirsti* n.sp.: 156, palp; 157, front tarsus and metatarsus; 158, posterior dorsal setae.

MICROSMARIS MINUTUS sp. nov.

Description: Very small species 0.825 mm. long. In life reddish with a distinct green shimmer. Legs I and IV distinctly longer than body, I 1,320 μ .

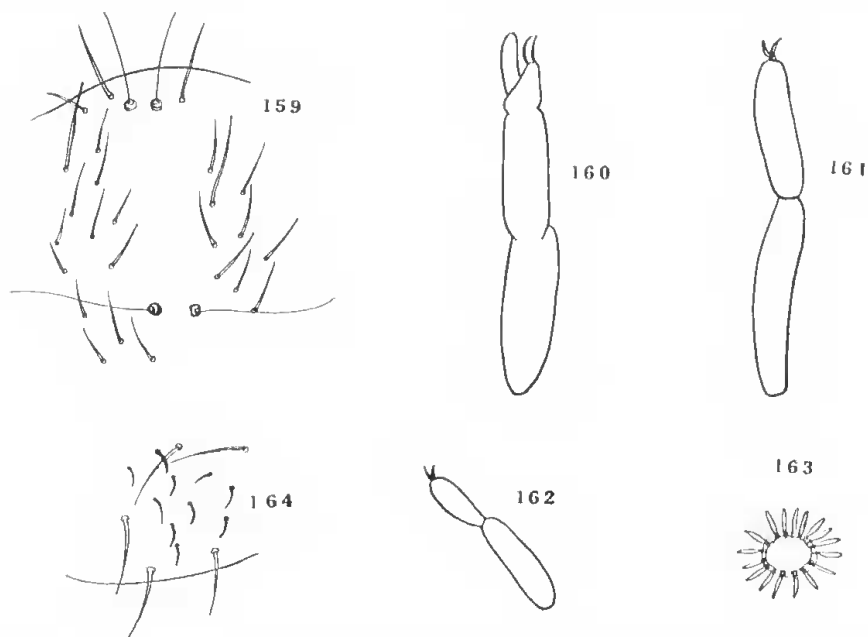


Fig. 159-164. *Microsmaris minutus* n.sp.: 159, anterior portion of dorsum showing sensory hairs; 160, palp; 161, front tarsus and metatarsus; 162, second tarsus and metatarsus; 163, one of the dorsal pits, posterior dorsal setae.

II 660 μ , III 740 μ , IV 1,050 μ , front tarsus more than twice as long as high, 120 μ by 55 μ , metatarsus 260 μ long. Eyes on each side placed medially to the two pairs of sensory hairs. Crista obsolete, but with two pairs of sensory hairs 120 μ apart, anterior hairs 50 μ long, posterior 80 μ long. Dorsum well clothed with two kinds of setae, mostly short, 30 μ long, but interspersed with long ones reaching 55 μ in length. Dorsum with the usual two pairs of pits lined with scale-like setae, but these setae are not so broad as in other species.

Locality: A large number of specimens taken by sweeping herbage on Mount Lofty, South Australia, January 1, 1934 (H.W.).

Syntypes: In the South Australian Museum.

KEY TO THE SPECIES OF MICROSMARIS.

1. Legs I and IV much longer than the body. Small species 0.825 mm.
M. minutus sp. nov.
- Legs I and IV shorter or not much longer than the body 2.
2. Dorsal setae sparse, of uniform size, small, about 15 μ long. Front tarsus three times as long as high *M. mirandus* Hirst.
 Dorsum posteriorly with some longer setae 3.
3. Longer dorsal setae only a little longer than the others. Front tarsus as long as high. The pairs of sensory hairs closer together *M. hirsti* sp. nov.
 Longer dorsal setae about three and a half times as long as the others. Front tarsus slightly more than twice as long as high. The pairs of sensory hairs wider apart *M. goanna* Hirst.

CALYPTOSTOMA Cambridge, 1875.

Syn. *Smaridia* Latreille, 1817.

Fessonia (v. Heyden) Banks, 1916.

CALYPTOSTOMA PROMINENS (Banks, 1916).

Syn. *Fessonia prominens* Banks, 1916.

The type from Ocean Grove, Victoria, taken by the late Mr. A. M. Lea in association with the ant *Iridomyrmex nitidus*, is in the South Australian Museum collections. Amongst the Hirst material left in Adelaide were four other specimens collected by Hirst at Menindie, South Australia, and labelled in pencil by Hirst as "Banks' genus". A further specimen was found by the writer under bark in the grounds of the Waite Institute, Urrbrae, South Australia, on September 3, 1933. From these additional localities the association of the type specimen with ants would appear to be accidental.

Excellent figures of the cephalothorax and dorsal hairs are given by Banks, but no other details. Drawings of the palp and front tarsus and metatarsus are now added, while certain morphological features are described which are not mentioned in the original description. These details, however, are not taken from the type, which is in poor condition, but from the specimen from the Waite Institute. Another example of this species was collected by myself at Victor Harbour, South Australia, in January, 1934.

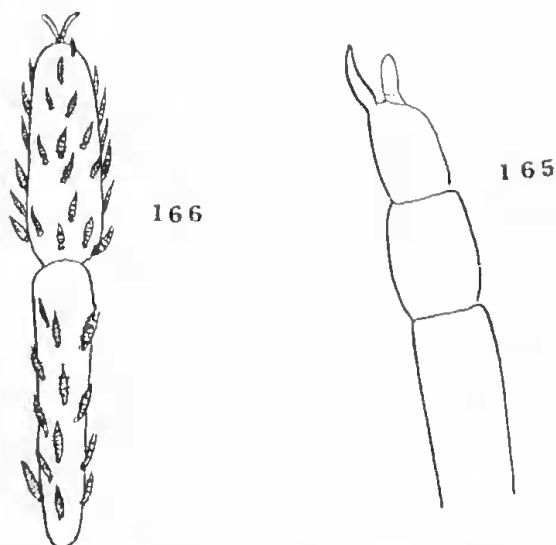


Fig. 165-166. *Calyptostoma prominens* (Banks): 165, palp; 166, front tarsus and metatarsus.

Length 0.65 mm. Palpi as figured, with long, slender claw and shorter but elongate tarsus which is not clubbed. Leg I 670 μ long, II 330 μ , III 330 μ , IV 500 μ , front tarsus (missing in type) 105 μ long by 38 μ high, metatarsus 135 μ . Dorsal hairs 20 μ long.

GENUS CAECULISOMA Berlese, 1888.

CAECULISOMA NASUTUM Hirst, 1928.

The type of this species, collected by Mr. A. M. Lea in the Cairns District of Queensland, is in the collections of the South Australian Museum.

The original description is very good, and little needs to be added. As in all species of the genus, however, the crista is continued behind the posterior sensillary area for some distance as a kind of dorsal groove. As no figures accompanied the original description, drawings of the important details are now given. These drawings are all from the type specimen. The front tarsi are missing, but

are probably longer than those of the other legs. The tarsus and metatarsus shown are those of leg IV.

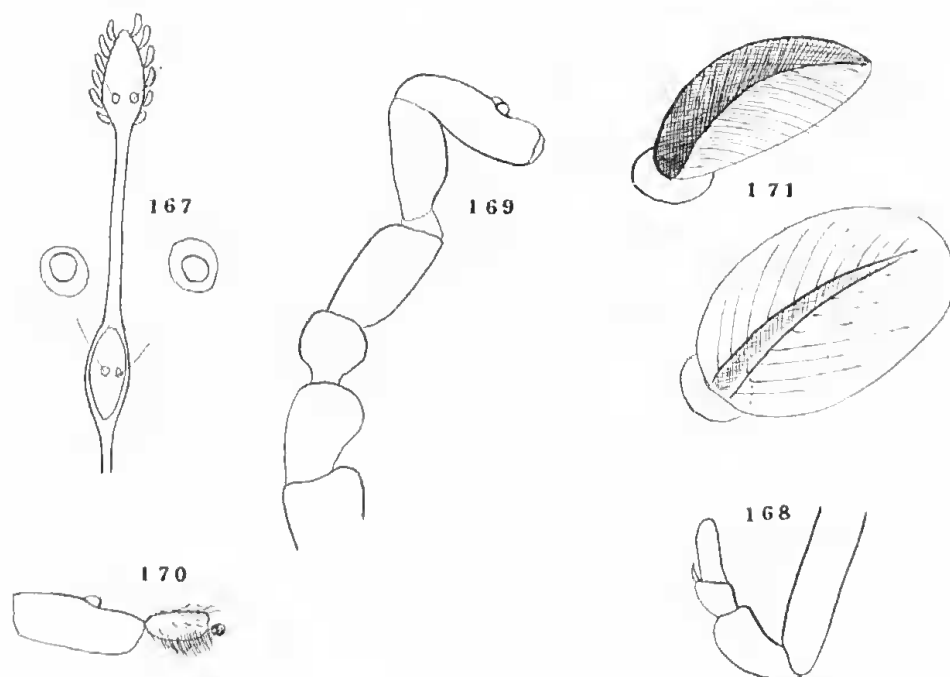


Fig. 167-171. *Caeculisoma nasutum* Hirst: 167, crista and eyes; 168, palp; 169, front leg without tarsus; 170, tarsus and metatarsus of leg IV; 171, two of the dorsal setae.

The species appears to be very closely related to *Caeculisoma tuberculatum* Berlese from Buenos Ayres, but I have not been able to see the original description and figures of this species.

CAECULISOMA MONTANA (Rainbow, 1906).

Syn. *Rhyncholophus montana* Rainbow, 1906.

I am indebted to the authorities of the Australian Museum, Sydney, for the opportunity of mounting and examining the type of this species, which was from Mount Kosciuszko, F.C.T. The original description, which was accompanied by a figure of the entire animal only, is quite inadequate, so that it is here re-described and figured in detail.

Length 3.0 mm., width 1.8 mm. Colour scarlet. Crista long and linear, with a swollen stigmal area at each end; the posterior area is, however, continued backwards for some distance as a dorsal groove. Eyes, said to be two on each side, but in the mount I can see only one, as in other species of the genus, sessile. Palpi long, as figured, with elongate tarsus placed terminally on the tibia and subequal to tibia, tibia with a very small outer claw. Legs shorter than body, all

tibia with tubercles or discs on the middle of the outer edge, the third segment of legs II and III with a distinct constriction, tarsi elliptical, front tarsus twice as long as others. Clothing consists of fairly numerous curved spiniform setae

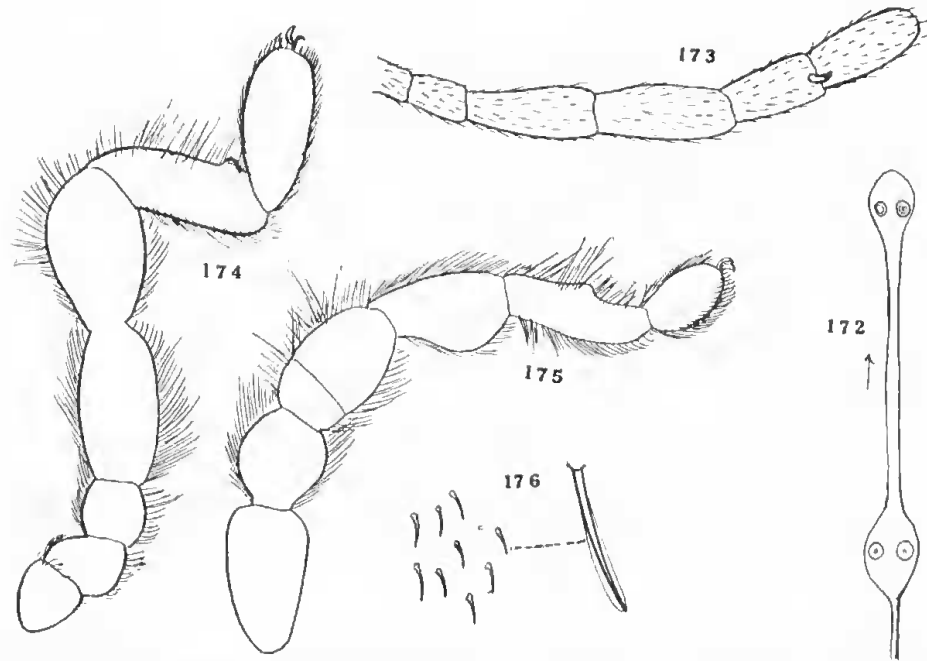


Fig. 172-176. *Caeculisoma montana* (Rainbow): 172, crista; 173, palp; 174, leg I; 175, leg II; 176, dorsal setae.

which taper to a point, but are surrounded by a narrow blunt-ended but delicate sheath. Legs very hairy with long hairs, tarsi with light scopulae.

CAECULISOMA ARGUS Vitzthum, 1926.

Dr. Vitzthum described this species (¹⁷) from a single example collected by Dr. Dammerman in Sumatra. In the South Australian Museum is a single specimen collected by Mr. R. V. Southcott at Glen Osmond, South Australia, in January, 1934.

This species is easily distinguished by the key.

CAECULISOMA RIPICOLA sp. nov.

Description of Adult: Length 1.17 mm., width 0.875 mm. Colour in life reddish-brown. Crista distinct, with anterior and posterior sensillary areas, the posterior area only a little prolonged backwards. Each area has two sensory hairs, which are comparatively short and simple. The anterior area of the crista has 8-9 long, serrated, scale-like setae. The crista is 350 μ long, sensory hairs

30 μ , and the scale-like setae on anterior area 40 μ long. Eyes one on each side, small, and placed behind the middle line of the crista. Legs I and IV about as long as body, II and III shorter, I 1,130 μ long, II 780 μ , III 875 μ , IV 1,225 μ , front tarsus elliptical, slightly longer than metatarsus, 165 μ long by 96 μ high, metatarsus 152 μ long, second and others much shorter than front and than their respective metatarsi, II–IV with distinct scopulae, all metatarsi with the characteristic discs. Palpi as figured, with small tibial claw, which is much shorter than the tarsus. Clothing of uniform scale-like setae which have longitudinal series of serrations; these scales are very numerous, and are not interspersed with simple spines, their length is 30 μ ; the scales are also present on legs II–IV on the outside, beginning at the metatarsi.

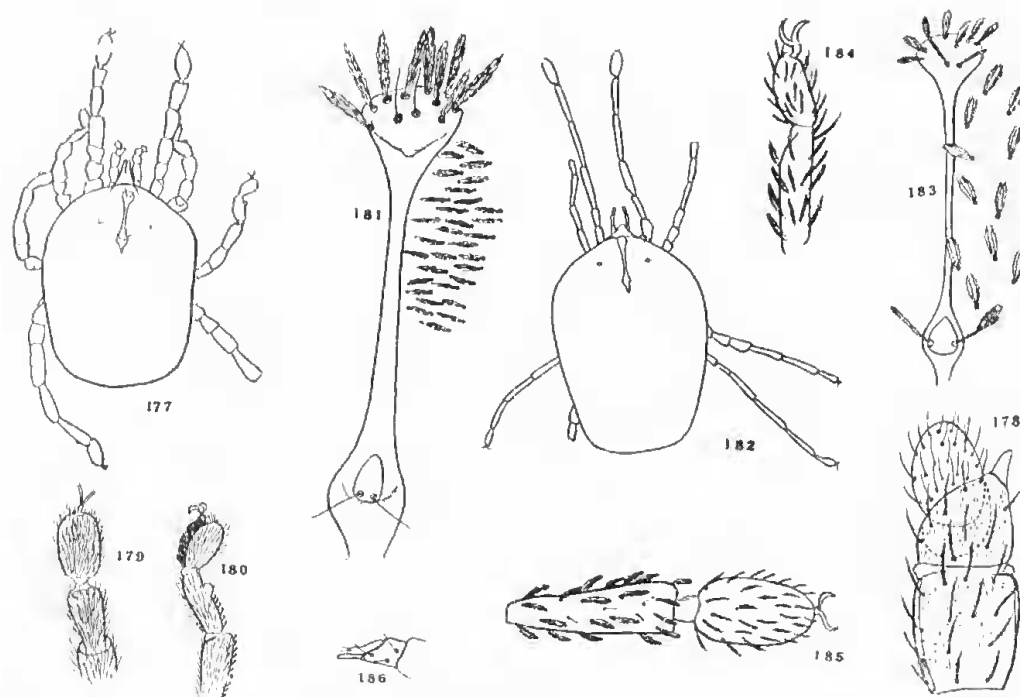


Fig. 177-186. *Cucculisoma ripicola* n.sp.: 177-181 adult: 177, entire dorsal view; 178, palp; 179, front tarsus and metatarsus from above; 180, tarsus and metatarsus of leg II; 181, crista. 182-186 nymph: 182, entire dorsal view; 183, crista; 184, front tarsus and metatarsus; 185, second tarsus and metatarsus; 186, tip of palp.

Description of Nymph: Length 0.875 mm., width 0.560 mm. Colour in life bright red. Crista present and distinct as in adult, but differs in that the sensory hairs are short, finely ciliated and distinctly swollen apically; the anterior sensillary area has fewer scale-like setae which are equal in length to those of the dorsum; length of crista 192 μ , of sensory hairs 35 μ . Eyes one on each side, small, and somewhat behind the median line of the crista. Palpi as figured. Legs very thin, I and IV about as long as body, II and III shorter; front tarsus

92 μ long by 46 μ high, metatarsus 110 μ ; all metatarsi are without the discs and there are no tarsal scopulae. Clothing of scale-like setae with longitudinal rows of serrations; these setae, however, are not so numerous as in the adult but of the same type; they are 15 μ long. The relative abundance of these setae on the dorsum of the adult and nymph is shown in the drawings of the crista. Scale-like setae are also present on the legs, but graduate into ciliated pointed setae on the tarsi. Legs I 610 μ long, II 435 μ , III 470 μ , IV 570 μ .

Localities: Only one specimen of the adult was found amongst large numbers of nymphs by sweeping the ti-tree shrubs along the banks of the Hindmarsh River, Victor Harbour, South Australia, in January, 1934 (H.W.).

Remarks: If one is correct in associating the nymphal forms with the single adult specimen, then the character of the metatarsal discs is only to be found in the adult stage of species of this genus. The difference in the sensory hairs of the crista in the two stages is also somewhat remarkable.

The type of the adult and the syntypes of the nymphs are in the South Australian Museum.

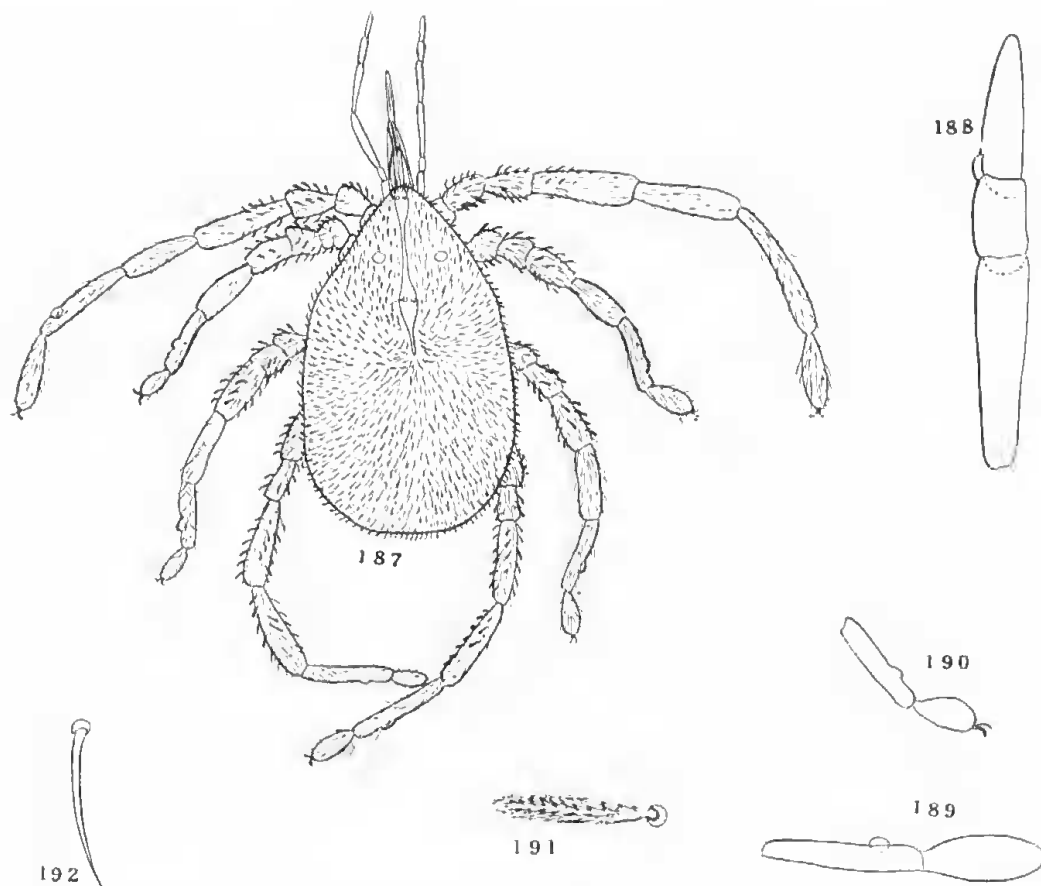


Fig. 187-192. *Carculisoma johnstoni* n.sp.: 187, entire animal from above; 188, palp; 189, front tarsus and metatarsus; 190, second tarsus and metatarsus; 191, dorsal seta; 192, ventral seta.

CAECULISOMA JOHNSTONI sp. nov.

Description: Length 1.38 mm. Colour red. Body widest in the hinder portion, 0.812 mm. Crista distinct, 800 μ long, with anterior and posterior sensillary area, the posterior area continued for a long distance as a dorsal groove; the distance between the sensory hairs is 415 μ , length of these hairs 50 μ ; the anterior area produced into a blunt nasus with about ten long, stout, serrated setae, which are slightly thickened apically. Eyes one on each side, placed in front of posterior sensillary area. Palpi long and thin, 520 μ . tibia with a short outer claw, tarsus longer than tibia. Legs I 2,110 μ long, II 1,300 μ , III 1,460 μ , IV 1,950 μ , front tarsus 290 μ long by 110 μ high, metatarsus 400 μ long; all metatarsi with the usual discs and tarsi II–IV with distinct scopulae. The peculiar discs are also present on the other segments of the legs, as described by Vitzthum for *C. argus*. Clothing dorsally of fairly numerous stout rod-like setae, which are strongly serrated and thickened apically, about 50 μ long; ventrally of plain curved setae of the same length. The stout serrated setae extend on the outside of the legs as far as the basal portion of the tibia.

Type: A single specimen from under bark at Mount Osmond, South Australia, February 3, 1934 (H.W.).

Remarks: This species is named after Professor Harvey Johnston, to whose valued help much of this paper is due.

KEY TO THE AUSTRALASIAN SPECIES OF CAECULISOMA.

1. Dorsal hairs feathered with long secondary hairlets, and interspersed with long, simple, slender spines. Large species 2.5 mm.
C. sulcatum (Vitzthum, 1926).
- Dorsal hairs not feathered 2.
2. Dorsal hairs as elongate clubbed papillae with short ciliae.
C. claviger Canestrini.
- Dorsal hairs not as above 3.
3. Dorsal hairs scale- or leaf-like 6.
- Dorsal hairs not so 4.
4. Dorsal hairs stout rod-like with strong short serrations; ventral hairs simple.
C. johnstoni sp. nov.
- Dorsal hairs short and curved, spiniform with narrow sheath, of uniform size, not serrated *C. montana* (Rainbow, 1906).
- Dorsal hairs of varying length and not as above 5.
5. Hairs of two distinct sizes, 35 μ and 190 μ , long, cylindrical, uniformly thick with short serrations *C. argus* Vitzthum, 1926.
- Entire animal with long, strong spines, all smooth above but strongly spined on outside *C. infernale* Vitzthum, 1926.

6. Dorsal hairs scale- or leaf-like, with strongly chitinized mid-rib and a broad, less chitinized, smooth-edged lamella *C. nasutum* Hirst, 1928.
 Dorsal hairs scale- or leaf-like, with longitudinal rows of serrations. Mid-rib not unduly chitinized. *C. ripicola* sp. nov.

Genus *HIRSTIOSOMA* gen. nov.

This genus is somewhat related to *Calyptostoma* and *Cacculisoma*. The body is widest anteriorly. Crista present, with anterior and posterior sensillary areas, each with two sensory hairs. Eyes one on each side on the medial line of the crista. Legs long and fairly thin. All tarsi above the claws with a pair of strong, slightly curved, simple spines arising from distinct papillae. No metatarsal discs. The dorsum is covered with peculiar three-winged short setae.

HIRSTIOSOMA SCALARIS sp. nov.

Description: Length 1.015 mm. Colour red. Body with a constriction medially, 570 μ wide in front of constriction, rather narrower below. Crista distinct, 325 μ long, with anterior and posterior sensillary areas, each with a pair

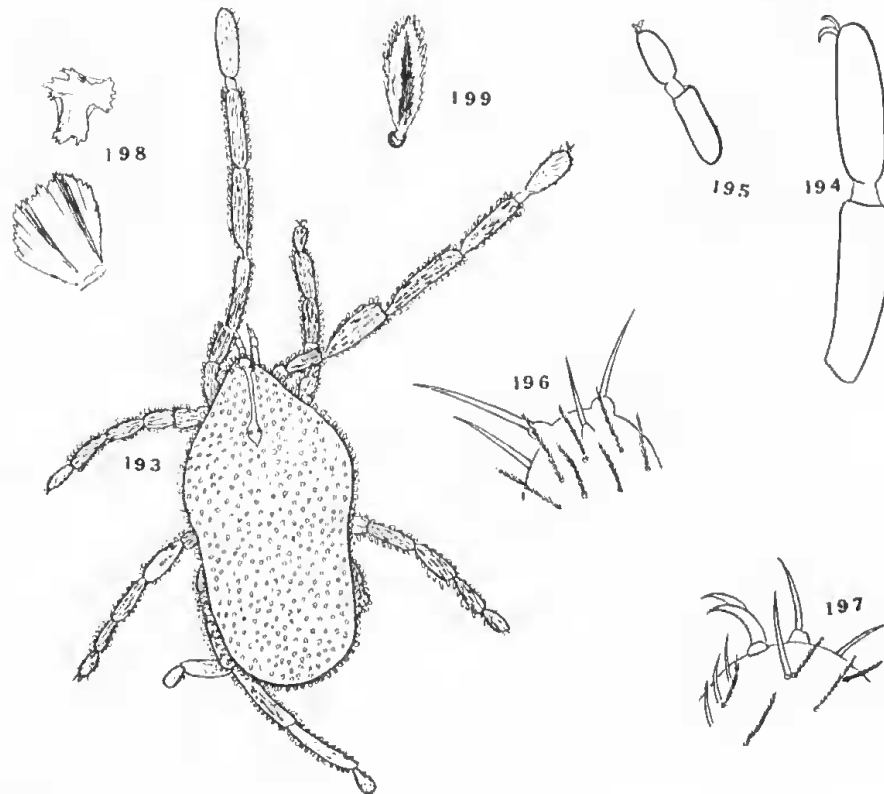


Fig. 193-199. *Hirstiosoma scalaris* n.g., n.sp.: 193, entire animal from above; 194, front tarsus and metatarsus; 195, second tarsus and metatarsus; 196, tip of tarsus from above; 197, tip of tarsus from side; 198, side and top view of dorsal setae; 199, seta from legs.

of sensory hairs about $40\ \mu$ long and simple. Eyes one on each side about the middle of crista. Palpi short, tibia with claw which overreaches the thumb-like tarsus, $160\ \mu$ long. Apical area of crista with a number of serrated scale-like setae. Legs I $1,100\ \mu$ long, II $500\ \mu$, III $500\ \mu$, IV $995\ \mu$, all segments except the tarsi with serrated scale-like setae; all tarsi above the claws with a pair of strong spines arising from distinct papillae, as well as one or two other simple spines, all other hairs feathered. Front tarsus $180\ \mu$ long by $54\ \mu$ high, metatarsus $210\ \mu$ long. Body hairs dorsally and ventrally short, broad, and three-winged, with serrated edges, apically blunt (cf. fig.).

Type: A single specimen taken by sweeping ti-tree bushes on banks of Hindmarsh River, Victor Harbour, South Australia, in January, 1934 (H.W.).

KEY TO THE AUSTRALIAN GENERA OF ADULT ERYTHRAEIDAE.

1. Eyes two on each side 2.
Eyes only one on each side 3.
2. Without crista, only one stigmal area. Gnathosoma drawn out. Legs shorter than body *Calyplostoma* Cambridge, 1875.
With crista and two sensillary areas. Gnathosoma not unduly drawn out. Legs I and IV often longer than body *Erythraeus* Latreille, 1806.
3. All metatarsi in adult with a pair of raised discs on outside. Legs short. Crista produced beyond the posterior sensillary area. Palpi elongate, with long terminal tarsus and minute tibial claw *Cacutisoma* Berlese, 1888.
Metatarsi simple, but tarsi with a pair of stout spines on distinct papillae above claws. Dorsal hairs three-winged *Hirstiosoma* gen. nov.
- Tarsi and metatarsi simple 4.
4. Clothing rather sparse. Dorsum with two pairs of rather large sensory pits. *Microsmaris* Hirst, 1926.
Clothing more abundant. No dorsal sensory pits 5.
5. Eyes placed in front of middle of crista *Leptus* Latreille, 1795.
Eyes placed behind the middle of the crista 6.
6. Tarsus of palp large and almost spherical *Sphaerolophus* Berlese, 1910.
Tarsus of palp more elongate, clubbed or not *Belaustium* v. Heyden, 1826.

LARVAL FORMS OF ERYTHRAEIDAE.

ERYTHRAEUS Latreille, 1806.

Dorsal shield as a rule broader than long and without a crista, in addition to the sensory hairs with 4–10 thickly ciliated setae; five-sided to round. One eye on each side. Claw of palp more or less forked, without ventral tooth. Mandible with strong curved claw. Galea dorsally with one pair of hairs. Coxae I and II

separated, each coxa with one hair, between the second pair of coxae with a pair of hairs, and between the third pair another pair of hairs.

ERYTHRAEUS PERTHENSE sp. nov.

Description: Dorsal scutum with anterior margin depressed from the anterior corners, slightly sinuate, with three pairs of thickly ciliated hairs of equal length, the most anterior pair at the extreme lateral corners, the others equally spaced therefrom and close together. Remaining portion of scutum round. Posterior pair of sensory hairs on the posterior edge of scutum, anterior pair only just

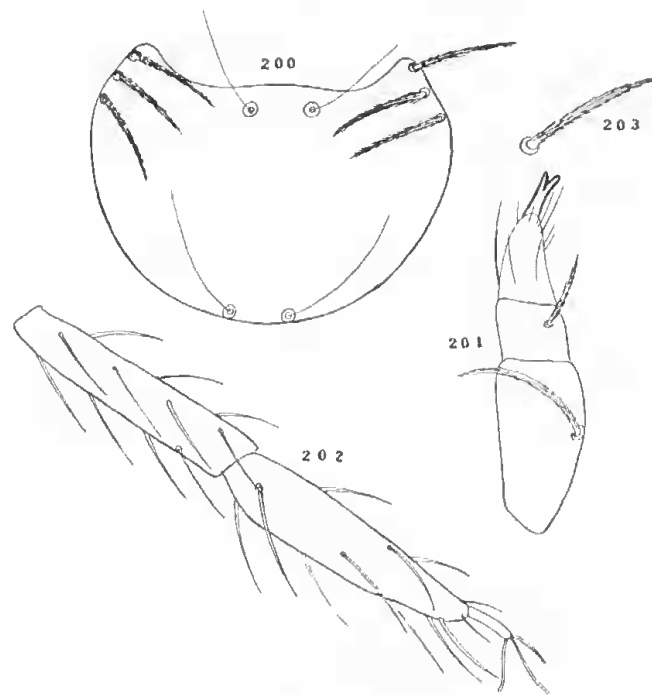


Fig. 200-203. *Erythraeus perthense* n.sp.: 200, dorsal scutum; 201, palp; 202, front tarsus and metatarsus; 203, hair of dorsal scutum.

within the anterior edge. Eyes one on each side. Dorsum with about 10 rows of 10 short, slightly curved setae in each. These setae appear to be simple, but under high magnification are delicately ciliated. Palpi typical of the genus, as figured, basal segment with a long, curved, feathered seta, next segment with a shorter and straight feathered seta, tibia and tarsus with apparently simple hairs. Palpal claw strong and bifid. Front tarsus and metatarsus subequal, with long, simple setae. Tarsal claws three, the hinder one ciliated, pulvilliform. Length of animal 750 μ , of scutum 66 μ , width of scutum 92 μ , length of sensory hairs 80 μ , of ciliated scutal hairs 35.5 μ , of dorsal hairs 27 μ . Length of front legs 415 μ , middle legs 415 μ , hind legs 415 μ , coxae with one seta.

Habitat: King's Park, Perth, West Australia, September 5, 1931.

Type: In the South Australian Museum.

ERYTHRAEUS BUFORANIUS sp. nov.

Description: Dorsal scutum almost round with but slight anterior angles, with three pairs of fairly long, heavily ciliated hairs. Anterior pair of sensory hairs placed at some distance behind the anterior margin of scutum, posterior

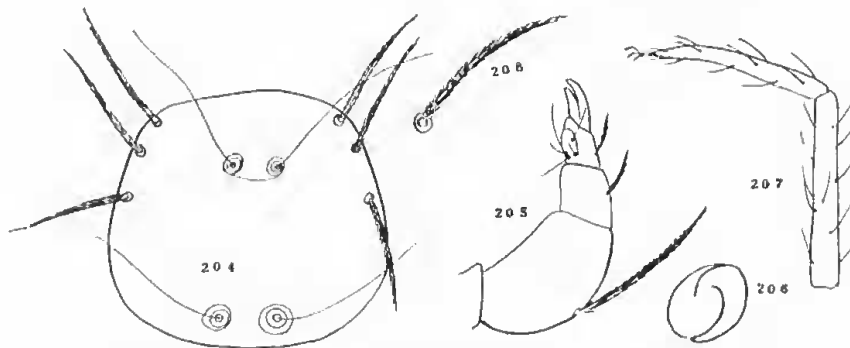


Fig. 204-208. *Erythraeus buforanius* n.sp.: 204, dorsal scutum; 205, palp; 206, claw of mandible; 207, front tarsus and metatarsus; 208, dorsal body seta.

pair subposterior. The hind pair of the ciliated hairs is quite twice as far behind the second that these are behind the first. Eyes one on each side. Dorsal body setae long, slightly curved, pointed, and strongly ciliated, in about 10 rows of 10 each. Palpi typical of the genus, as figured, with a feathered hair on each of the first three segments, tarsus with apparently simple hairs, claw bifid apically. Front tarsus slightly shorter than metatarsus, long and thin, with long simple setae, tarsal claws 3, the hind one pulvilliform. Length of animal 585 μ , width 330 μ , length of scutum 95 μ , width 95 μ , length of sensory hairs 66 μ , of ciliated scutal hairs 42 μ , of dorsal body hairs 30 μ . Front legs 620 μ , middle 620 μ , hind legs 620 μ , front tarsus 135 μ , metatarsus 162 μ , coxae with one hair.

Habitat: On an Acridid (*Buforania* sp.), from Mullewa, West Australia, in September, 1931.

Syntypes: In the South Australian Museum.

ERYTHRAEUS DASYPODIAE sp. nov.

Description: Dorsal scutum longer than broad, 150 μ by 115 μ , with 3 pairs of moderately ciliated hairs 75 μ long, anterior sensory hairs 57 μ long, posterior 115 μ . The posterior sensory hairs are right on the posterior margin of scutum, the anterior sensory hairs in a line with the second pair of ciliated hairs. Palpi

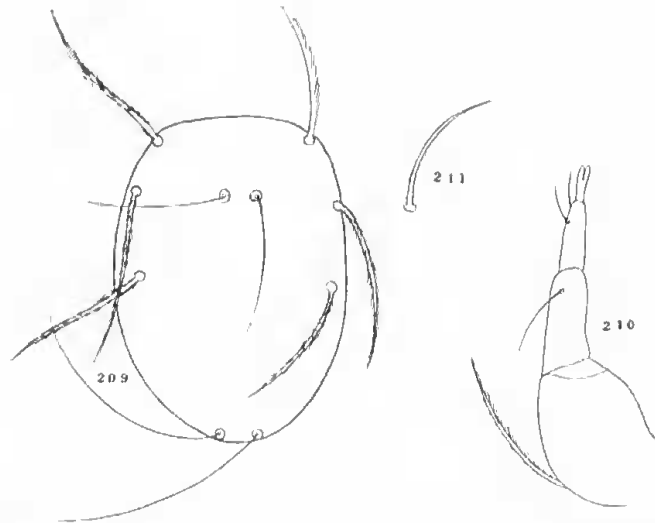


Fig. 209-211. *Erythracus dasypodiae* n.sp.: 209, dorsal sentum; 210, palp; 211, dorsal seta.

as figured. Claws of mandible strong and strongly curved. Legs uncertain, as the specimens are damaged. Dorsal body hairs sparse, simple, or only very slightly ciliated, $40\ \mu$ long. Length of animal $1,825\ \mu$, width $1,500\ \mu$.

Habitat: Two specimens received from Canberra and labelled as "taken on the Peacock Moth".

Syntypes: In the South Australian Museum.

LEPTUS Latreille, 1795.

Syn. *Achorolophus* Berlese, 1891.

Dorsal shield generally broader than long, without erista, besides the sensory hairs with 2-4 thickly ciliated hairs, more or less triangular in shape. Eyes one on each side. Claw of palp simple without ventral or dorsal teeth, palpi not forceps-like. Claw of mandible very minute. Coxae I and II separated, all coxae with one hair and a pair of hairs between each pair of coxae. Hind claw of tarsus pulvilliform.

LEPTUS CHELONETHUS sp. nov.

Description: Dorsal sentum triangular, anterior margin slightly convex, lateral margins slightly concave, corners rounded, with two pairs of stout, comparatively short, and strongly ciliated hairs; posterior pair of sensory hairs quite posterior in position, anterior pair slightly behind the anterior angle, sensory hairs delicately ciliated. Eyes one on each side. Dorsal setae in about 10 rows of 8-10 each, somewhat irregular. These setae are stout rod-like, slightly curved

and strongly ciliated. Palpi straight and typical of the genus, all segments with long ciliated setae, claw simple. Legs long, front tarsus slightly elliptical, a little shorter than the metatarsus and much wider, each with one long, simple seta and many rather short, stout, ciliated setae. Tarsal claws 3, the hinder one pul-

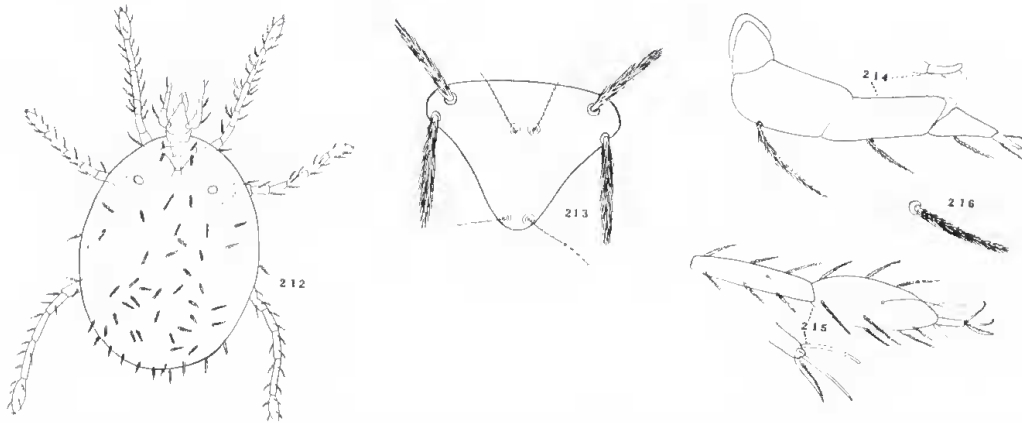


Fig. 212–216. *Leptus chelonethus* n.sp.: 212, entire dorsal view; 213, dorsal scutum; 214, palp; 215, front tarsus and metatarsus; 216, dorsal seta.

villiform. Length of animal 610 μ , width 330 μ . Length of scutum 55 μ , width 66 μ , of sensory hairs 30 μ , of anterior ciliated hairs 33 μ , of posterior ciliated hairs 48 μ . Dorsal body hairs, 42 μ long. Length of front legs 350 μ , tarsus 78 μ by 24 μ high, metatarsus 80 μ , middle legs 330 μ , hind legs 420 μ . All coxae with a single hair.

Habitat: On a Pseudoscorpion from Rottneest Island, West Australia, on January 31, 1931.

Type: In the South Australian Museum.

Remarks: Close to *L. terebrans* Vitz. from Sumatra, but differs in the sental setae and dimensions of front tarsi.

LEPTUS BATHYPOGONUS sp. nov.

Description: Dorsal shield triangular with well-rounded corners and faint indications of a crista, besides the sensory hairs with two pairs of stout, short, and strongly ciliated hairs, the anterior pair shorter than the posterior pair; the anterior pair of sensory hairs is placed in a line with the anterior pair of ciliated hairs, the posterior pair is subposterior in position. Eyes one on each side. Dorsal body setae in about 10 rows of 6–10 each; these are short, rod-like, and strongly ciliated. Palpi straight as in the genus, each segment with the usual ciliated hairs as figured, claw typical. Legs long, front tarsus long and parallel-

sided, this segment and the metatarsus with one long, simple seta, but this is not as long as in the preceding species, the other setae fairly long and strongly ciliated, tarsal claws 3, the hinder one pulvilliform. Length of animal 660 μ , width 330 μ , length of scutum 80 μ , width 93 μ , sensory hairs 55 μ , ciliated hairs 40 μ . Length of dorsal body hairs 18 μ . Length of front legs 670 μ , tarsus 133 μ , metatarsus 144 μ , middle legs 520 μ , hind legs 680 μ . All coxae with one seta.

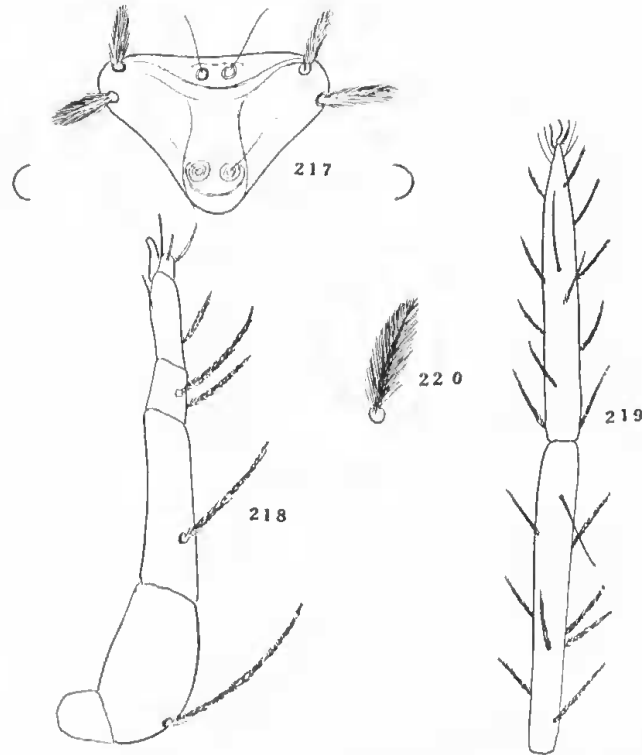


Fig. 217-220. *Leptus bathypogonus* n.sp.: 217, dorsal scutum and eyes; 218, palp; 219, front tarsus and metatarsus; 220, dorsal seta.

Habitat: On an Asilid (*Bathypogonus* sp.), Perth, West Australia, in August 13, 1931 (B.A.O.C.).

Syntypes: In the South Australian Museum.

Remarks: This species is still more closely related to *L. terebrans* Vitz. It has the tarsi of the front pair of legs 8 times as long as high, while in Vitzthum's species they are only 4 times as long.

HAUPTMANNIA Oudemans, 1910.

Dorsal shield generally broader than long, without crista, besides the sensory hairs with 2-10 thickly ciliated hairs, more or less triangular. One eye on each side. Palpi forceps-like, claw without dorsal or ventral teeth, simple, with lateral

accessory tooth. Tarsus of palp with distinct inner claw-like hair. Claws of mandible strongly curved. Coxae I and II separated, all coxae with one hair and a pair of hairs between each pair. Claws 3, the middle thinner and longer, in addition there is a pulvilliform hair.

HAUPTMANNIA WESTRALIENSE sp. nov.

Description: Dorsal scutum rectangular, slightly longer than broad, with two pairs of ciliated hairs in addition to the sensory hairs. The front pair of sensory hairs are situated in a subanterior position and the hinder pair a little behind the

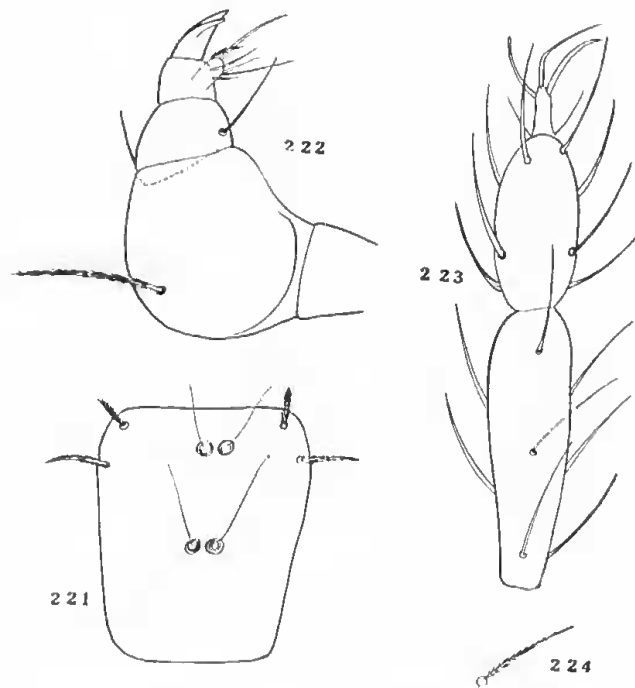


Fig. 221-224. *Hauptmannia westraliense* n.sp.: 221, dorsal scutum; 222, palp; 223, front tarsus and metatarsus; 224, dorsal seta.

medial line. The anterior ciliated hairs are sublateral in position, and the posterior pair lateral and a little behind the front sensory hairs. Eyes one on each side. Palpi forceps-like with a strong claw, which has an accessory claw laterally; except on the two basal segments the hairs on the palps all appear to be simple and not ciliated. Dorsal body hairs long and thin and finely ciliated, in about 10 rows of 6-8 in each. Legs long and thin, front tarsus much shorter than metatarsus, elliptical, all setae long and simple, not ciliated; tarsal claws 3, hind one long and thin, not pulvilliform. Length of animal 760 μ , of dorsal scutum 120 μ by 93 μ high, of sensory hairs 50 μ , of scutal ciliated hairs 40 μ , of dorsal

body hairs 33 μ , front legs 370 μ , tarsus 53 μ by 26 μ , metatarsus 70 μ , middle legs 60 μ , hind legs 68 μ . All coxae with a single hair.

Habitat: Chittering, West Australia, October 16, 1931, under stones (H.W.).

Type: In the South Australian Museum.

HAUPTMANNIA MULLEWAENSIS sp. nov.

Description: Dorsal scutum somewhat heart-shaped with a distinct waist antero-medially, with two pairs of pointed, ciliated hairs and two pairs of sensory hairs, all of which are placed in front of the waist. Eyes one on each side. Palpi as figured, without ciliated hairs, claw strong with lateral accessory claw. Dorsal body hairs long, curved, and ciliated, in 6-8 rows of 6-8 each, on venter

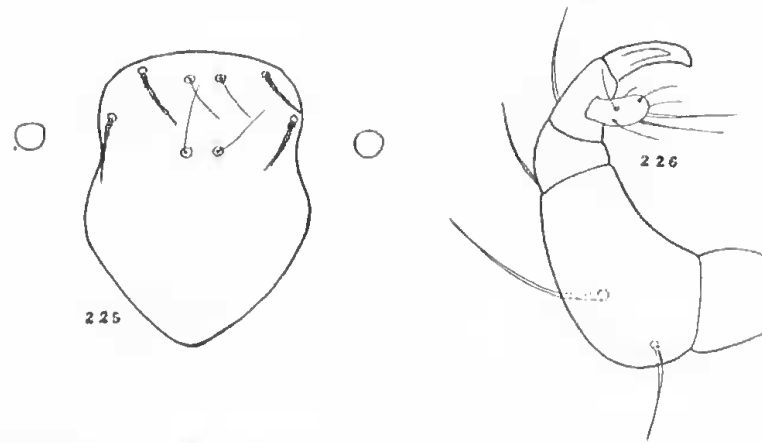


Fig. 225-226. *Hauptmannia mullewaensis* n.sp.: 225, dorsal scutum and eyes; 226, palp.

longer, finer, and not ciliated. Legs long and thin. front tarsus parallel-sided, truncate apically, shorter than metatarsus, with long, thin, simple setae, claws 3, the hind claw long and thin, not pulvilliform. Length of animal 1,000 μ , width 500 μ , dorsal scutum 235 μ long by 185 μ wide, sensory hairs 52 μ long, ciliated hairs 48 μ , dorsal body hairs 40 μ , ventral hairs 48 μ . Front legs 600 μ long, tarsus 93 μ long by 24 μ high, metatarsus 130 μ , middle legs 420 μ long, hind legs 470 μ . All coxae with a single hair.

Habitat: Mullewa, West Australia, in September, 1931, on herbage (H.W.).

Type: In the South Australian Museum.

Genus BELAUSTIUM v. Heyden, 1826.

Dorsal scutum oblong, narrow, with crista. One eye on each side. Claw of mandible strong and curved. Galea dorsally without hairs. Claw of palp with small ventral tooth. All coxae approximating. Three claws on each foot, the

middle one longer and thinner than the others; in addition there is a pulvilli-form hair.

BELAUSTIUM CRISTATUM sp. nov.

Description: Length of body 420 μ , width 250 μ . Colour in life red. Dorsal scutum indistinct but elongate and narrowed slightly in the middle, 42 μ wide anteriorly and posteriorly. Crista distinct, with anterior and posterior pairs of

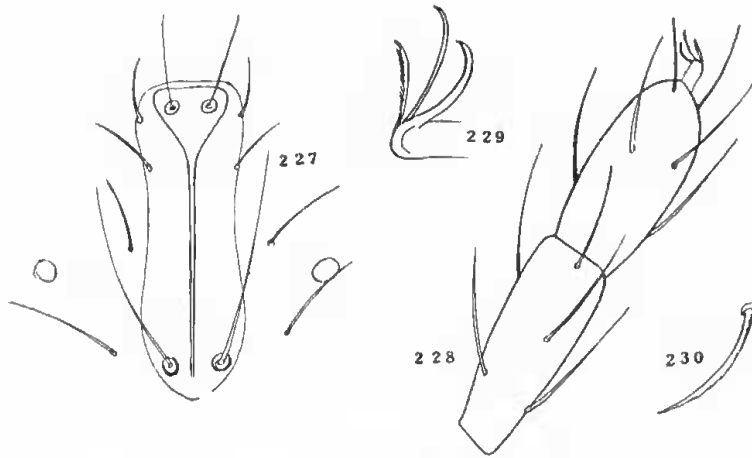


Fig. 227-230. *Belaustum cristatum* n.sp.: 227, dorsal scutum, crista, and eyes; 228, front tarsus and metatarsus; 229, claws; 230, dorsal seta.

sensory hairs, the anterior pair within a triangular area. Eyes one on each side and slightly behind the middle of the scutum. Palpi normal for the genus. Legs short, I 280 μ long, II 240 μ , III 280 μ , front tarsus 58 μ long by 21 μ high, elliptical, metatarsus 30 μ long. Body hairs fine and pointed, indistinctly ciliated on one side, 28 μ long. Claws of tarsi 3, the inner ? one shorter and stouter, the outer ? one pulvilliform.

Habitat: In large numbers on Salvation Jane (*Echium plantagineum* L.) at Glen Osmond, South Australia, September 1, 1933 (H.W.). Most examples were free, but many were attached to larval Jassids and other insects.

Syntypes: In the South Australian Museum.

BOCKARTIA Oudemans, 1910.

Dorsal shield broader than long, without crista. Claw of palp without ventral tooth, with small dorsal tooth. Scutum with two pairs of sensory hairs and 4 thickly ciliated hairs. Eyes two on each side. Mandible with strongly curved claw. Galea with one pair of dorsal hairs. Coxae I and II separated, all coxae with 1 hair. Tarsi with 3 claws, the lateral ones pulvilliform.

BOCKARTIA ? LONGIPES sp. nov.

Description: Length 350 μ , oval. Colour in life red. Dorsal scutum generally much broader than long, but in the specimen figured much less so, almost quite round, no angles, length 112 μ , width 150 μ , with the usual two pairs of sensory hairs, which are 65–70 μ long and finely ciliated. Dorsal scutum with

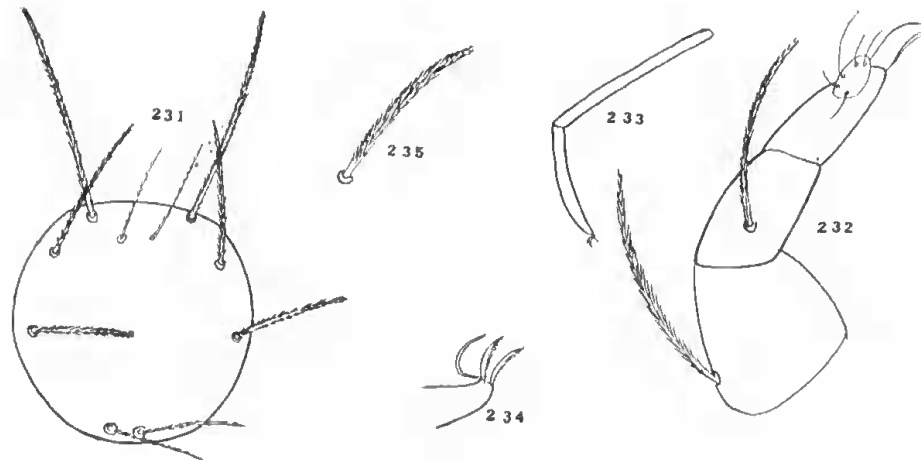


Fig. 231–235. *Bockartia longipes* n.sp.: 231, dorsal scutum; 232, palp, 233, front tarsus and metatarsus; 234, claws; 235, dorsal seta.

three pairs of densely ciliated hairs, one pair on anterior edge 88 μ long, another 80 μ long just posterior of the anterior sensory hairs, and a third pair 80 μ long just posterior of the medial line. Dorsal body hairs rather numerous, 80 μ long, stout, and strongly ciliated. Legs very long, I 960 μ , II 880 μ , III 1,150 μ , front tarsus 162 μ long, metatarsus 285 μ . Tarsi with three claws, the middle one long and thin and simple, the lateral ones pulvilliform. Eyes two on each side. Palpi as figured by Oudemans for *B. kuyperi*.

Habitat: Along with the preceding species at Glen Osmond, South Australia, September 1, 1933.

Syntypes: In the South Australian Museum.

Remarks: This species, although referred to Oudemans' genus, does not agree in that it has three pairs of ciliated hairs on the dorsal scutum instead of two pairs, as defined above. It also lacks the sinus on the posterior edge of the scutum.

KEY TO THE AUSTRALIAN LARVAL FORMS OF ERYTHRAEIDAE.

1. Dorsal sentum long and narrow with distinct crista. One eye on each side.
Three tarsal claws, middle one long and thin, outer one pulvilliform.
Belaustium cristatum sp. nov.
Dorsal sentum broader than or as broad as long. Without crista . . . 2.
2. Dorsal sentum broader than long, with 4–6 ciliated hairs. Eyes two on each side. Both lateral tarsal claws pulvilliform. *Bockartia longipes* sp. nov.
Dorsal sentum broader than long, with 2–10 ciliated hairs. One eye on each side 3.
3. Dorsal sentum more or less pentagonal to round, with 4–10 ciliated hairs . . . 4.
Genus *Erythraeus* Latreille.
Dorsal sentum triangular or otherwise shaped, with 2–4 ciliated hairs . . . 6.
1. Sentum with depressed sinuate anterior margin, with 6 equally spaced ciliated hairs *Erythraeus perthense* sp. nov.
Dorsal sentum almost round, with rounder anterior angles and convex anterior margin, with 6 ciliated hairs 5.
5. Dorsal sentum broader than long, hairs heavily ciliated. Body hairs more numerous. Scutal hairs evenly spaced . . . *Erythraeus buforaninus* sp. nov.
Dorsal sentum longer than broad, hairs not so heavily ciliated, evenly spaced. Body hairs sparser *Erythraeus dasyppodiae* sp. nov.
6. Sentum triangular. Palpi not forceps-like. Hind claw of tarsus pulvilliform 7
Genus *Leptus* Latreille.
Sentum otherwise. Palpi forceps-like. Hind claws of tarsus simple and others pulvilliform 8.
Genus *Hauptmannia* Oudemans.
7. Crista indistinctly indicated. Front tarsus long and thin.
Leptus bathypogonus sp. nov.
Crista quite absent. Front tarsus short and elliptical.
Leptus chelonethus sp. nov.
8. Sentum rectangular, posterior sensory hairs behind the middle. Front tarsus short and elliptical *Hauptmannia westralicense* sp. nov.
Sentum pointed apically and with a distinct waist. Anterior tarsi longer, parallel-sided *Hauptmannia mullerwaense* sp. nov.

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